Australian Model Engineering

May-June 2001

Issue 96

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- ☑ Build a Low Cost Track Straightener

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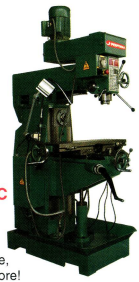

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Front cover

This 1996 scene shows Bob Nash's Union Pacific 4-8-4 thundering along on 'T' section rails on the Morphett Vale Railway. To read about making these realistic looking rails combined with the use of plastic sleepers, turn to page 11. Photo: Brian Carter

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Comment

It's a mental thing!

Completing that model engineering project is a mental thing. I never doubted that I would eventually build my first steam locomotive. As with many others, I'm basically self-taught because I do not have a trade background. **I don't believe anyone is ever too inexperienced to be successful; it's attitude that counts, not trade experience**.

My personal success came through making the decision to start and finding out from others what to do. The gradual accumulation of the necessary tools occurred over the years of construction. They were not purchased until there was a demand for them, so it has been a progressive process.

After the initial decision that I wanted to be a model engineer came the choice of locomotive. There were many I liked. **Not one of these was chosen!** Instead, a list of criteria was made:

- It was to be five inch gauge, the most popular in Australia;
- An 0-4-0 with outside cylinders would be simplest;
- Plans in five inch gauge and castings should be available;
- There should be a description of construction;
- A tender engine would enable fairly long non-stop running, because there would be ample water and coal supplies.

Without having seen even a general outline, (the late) Don Young's Rail Motor No.1 was selected from the catalogue of a Sydney ME supplier and the plans and castings were ordered. Later I acquired photocopies of Don's detailed *ME* construction series.

Success comes from patience and determination. Just like work and relationships, model engineering should become part of your way of life. Over the years I have been asked how I found the time to finish the engine. My reply is that I worked on it consistently and that I made the time to be in the workshop. If you really want to build something it is difficult not to want to be in the workshop.

So, throw away your self-doubts, set a realistic goal, develop a work ethic for your hobby such as one or two hours per night, ask for help from club members when you need it, don't take soft options like watching TV and you, too, will join the ranks of those answering the questions about how **you** built it.

Hugh Elsol

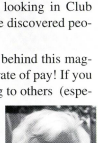
Join us in a great hobby!

If this is your first issue of *Australian Model Engineering*, welcome!

In successive issues we cover many topics centred on that wonderful process of model engineering — alias *tinkering*.

If you're new to model engineering as well as to our magazine, you'll benefit from getting together with other model engineers — we're good at sharing ideas and saving each other money! If you don't have any contacts, start by looking in Club Round-up to find a club that's near to you. Many of our readers have discovered people with similar interests literally just around the corner.

Helping other model engineers is the simple idea of the volunteers behind this magazine. Our readers write items for us — for the same (non-existent) rate of pay! If you have ideas, opinions or techniques that you feel would be interesting to others (especially from the newcomer's angle), please drop us a line. We can send you a useful guide and help with preparing artwork or editing.



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David Proctor
Managing Editor

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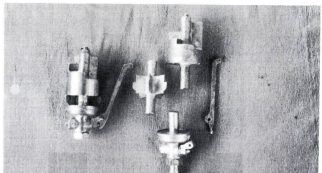

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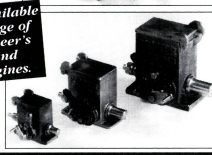

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The Development of 'T' Section Rail and the Use of Plastic Sleepers

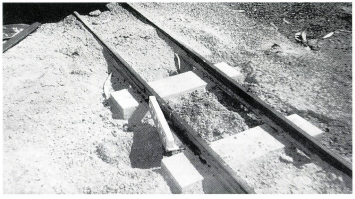
by Karl Hampel

Photos by the author, drawings for publication by Peter Manning

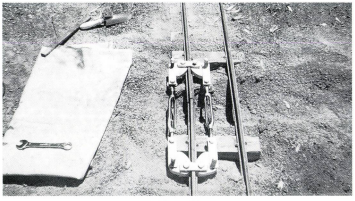
The use of ladder type track using steel cross ties welded to bar 25mm x 12 mm to form the running rail has never appealed to me, mainly because of its inflexibility, strength, fish plate joining, appearance, difficulty in manufacture and inability to use a prototype signal system. When I was appointed Perway Co-ordinator for the Morphett Vale Railway back in June 1987, I persuaded the club to put in a test section of track using 'T' section rail on the third platform road in the station. This was made from bar 25mm x 12mm, as the running rail and 25mm x 6mm as the base welded to it to form the inverted 'T' section. From this, several small lengths of 'T' track were used to replace bad sections.

In February 1990 discussions took place on how to improve the track as it had suffered damage from vandals and council vehicles driving over it. I suggested that we start a programme to relay and build new track of the 'T' section design with an increase of the base from 25mm x 6mm to 32mm x 6mm. The reason for this was to gain strength and provide sufficient room to use an air drill to drive in the Tek screws which we used to fasten the track to the sleeper. Several bad sections of the track were replaced, however this was put on hold for a while as a club member suggested we should try tube as a running rail, and a 24 metre section was laid on the loop line. Also during this time I had 18 metres of aluminium rail at home not being used as I had dismantled my home track. This rail was laid on a sharp curve on the loop line. The tube rail was nice and smooth to ride on, but several factors prevented further use.

Firstly, the tube could not be pulled around to form a curve, it had to be rolled and as 80% of our track is curved it would cost a lot of time and money to roll. Secondly, every 9 inches a small base plate would be required — having two holes drilled to accept screws and then this plate welded to the tube, very time consuming and difficult. Thirdly, if the tube sustained damage, e.g. bent, it could not be straightened, but would need to be replaced and this is a major problem on our reserve as council vehicles drive over the track daily ('T' section rail can be easily crowed back into its original form). Fourthly, as a big portion of the track is signalled I could not find a satisfactory method of making insulated joints to fit the tube. The aluminium rail was also smooth to ride on but suffered a major problem — that being acute wear and for this reason it also was



Fishplate



Rail puller

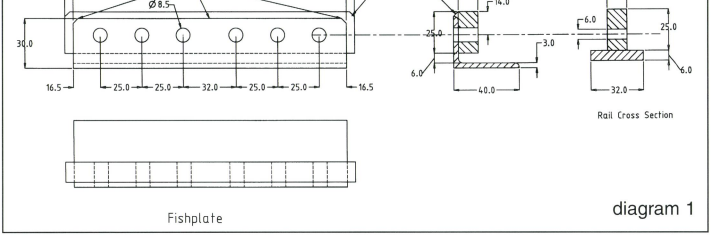
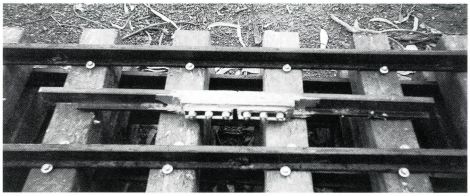


diagram 1



Pre-made insulated joint ready to cut into track

Fishplate

not pursued. The 'T' section track is very easy to make — the one ingredient for ease of manufacture is a sleeper jig, holding the sleepers evenly apart and at right angles to the running rail. This is achieved by welding an old short length of bar 25mm x 12mm onto a large 'I' beam girder which I scored from the South Australian Railways. These short lengths of bar are welded across the beam at sleeper width, in our case is 65mm + 1mm for clearance and a sleeper spacing of 155mm between sleeper centres.

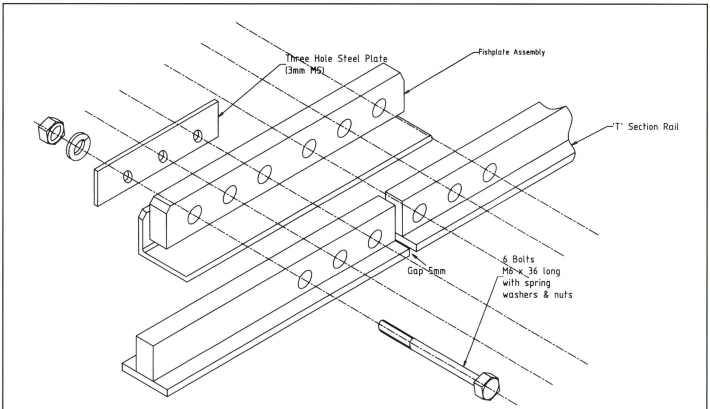
No track gauge jig is required as the pre-drilled sleepers make it unnecessary. The 'T' section rail is also easy to make. To centre the 6m x 25mm x 12mm bar on the 6m x 32mm x 6mm base also requires a simple jig made from scrap material so designed that it fits over the loosely assembled 'T' section. This jig, now clamped, holds both portions firmly together for stitch welding the rail to the base every 8 inches (using several of these jigs speeds up construction). All 'T' section track is made straight and then curved in situ this then creates the transition into and out of the curve automatically.

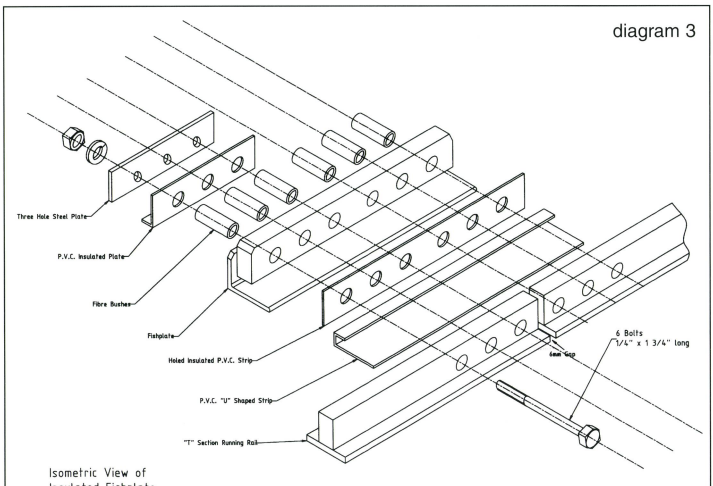
Fishplate design originally took the form of 1" x 1" x $\frac{1}{4}$" angle 6" long with three $\frac{1}{2}$" x $\frac{1}{4}$" elongated holes at one end to allow for rail movement and the other end welded to the rail. This was alright to a point but still did not stop the rail ends from becoming bruised as the angle did not stop the rail from vertical movement.

As we all know prototype fishplates fit snugly between the rail head and base of the rail and not touching the web, this snug wedge type fit being what preserves the rail ends. After two years of experimenting with various types of fishplates I eventually came up with a design which I feel is the solution.

The fishplate we now use consists of a short length of old bar 25mm x 12mm x 175mm long (fishplate bar) and a piece of angle 165mm x 40mm x 40mm x 3mm. One side of the angle is reduced to 30mm and welded to the top of the fishplate bar. This angle adds strength to the fishplate because when you drill the 8.50mm holes in the fishplate it is weakened at these points (**see diagram 1**). The 8.50mm holes drilled in the fishplate allow just sufficient movement for the fishplates to accommodate any rail expansion.

The other major factor is that the 40mm side of the angle is under the base rail giving it support and preventing the rail ends from moving down while the





fishplate bar, now sitting on top of the base, prevents the rail from moving up. When the fishplate is bolted to the rail it all becomes a strong and snug fit, so preventing bruising or dipping of the rail ends.

I originally used 25mm x 25mm x 3mm angle and found this allowed the fishplate to bend when pulling the rail ends around on curves. I have not found a bent fishplate since using the larger angle.

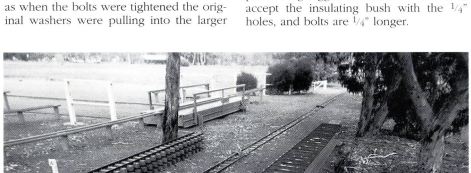
Where fishplates are used to join the running rails together it is most important that a stitch weld is made near the end of the rail, on the opposite side of the fishplate. This ties the base to the bar preventing the bar portion from bending when tightening up the fishplate bolts especially on curves.

I put three 6mm or 1/4" holes in the ends of each running rail as **per diagrams 2 and 3**. A rail drilling jig is required to do this work, made from a fishplate with 6mm or 1/4" holes and case hardened — lasts longer. The expansion gap of 5mm appears to be sufficient regardless of the length of continuous welded rail. On straight sections we have up to four six metre lengths welded and on curves this is reduced to two six metre lengths welded. All curves are given 1/8" cant, which is more than sufficient for our maximum speed of 13 kph. I have found that if more than 1/8" cant is given there is a tendency for the low leg to lift, creating negative cant. The track gauge on straight and curves is $7^{5}/_{16}$", the reason for this being that the sleeper drilling jig was designed to allow for wider gauge on curves.

The bolts used for the fishplates are Whitworth 1/2 x 1/4" hex head or equivalent in metric, galvanised, using Nyloc® nuts. Washers were originally used to cover the 8.50mm holes in the fishplate, but this has been changed to a thin plate of the same washer width and thickness covering all three holes. The reason for this is to provide a larger area for the nut to pull up on, as when the bolts were tightened the original washers were pulling into the larger hole and not allowing the fishplate to freely move. It also prevents a fishplate bolt from jamming as this plate supports all three bolts.

When fitting fishplates to the rail I always grease them, making sliding of surfaces easier. All fishplates are oiled once a year with old oil

Insulated fishplates used for track circuit signalling are made similar to that shown in the diagram, holes in the fishplate being bigger at 10.50 mm. This is to accept the insulating bush with the 1/4" holes, and bolts are 1/4" longer.



Track panel sleeper jig, three 6 metre track panels (background)

The gap between the bottom of the fishplate bar and the angle is made bigger to accept PVC 'U' beading. To insulate the fishplate bar from the running rail, I use 25mm x 25mm x 2.5mm plastic angle cut to the length of the bar and then cut in half to form two strips 25mm x 2.5mm. The rail drilling jig is used to make the holes in the strip, the other part of the strip is also drilled using the jig, then cut in half. Each three holed strip is then fitted over the bolt protruding through the fishplate. Next fit the three holed plate over this, fit nuts and tighten. However, before fitting to running rail, smear all surfaces with silicon — this helps with insulation and reduces rust.

Where insulated fishplates (IJ's) are used I put in two plain fishplates about one metre either side of the (IJ), which reduces the possibility of the (IJ) rail ends from closing up in hot weather causing signal failures. This fishplate design allows their fitting anywhere that plain fishplates are used and vice versa, as the hole size and spacing in the running rail remains the same.

On track circuited sections I fit a bond wire around the plain fishplate for circuit conductivity of the rails. The wire is $^{3}/_{16}$" in dia and welded to the rail and is bent into the form of a shallow "V". The wire size makes it difficult for the vandals to break, but allows sufficient flexibility to accommodate the 5mm rail movement.

When laying track to form a curve we weld the track into continuous lengths and after ballasting, cut the rail every 12m. These cuts are not opposite but staggered, which strengthens the fishplate joint opposite to hold the radius within the joint area.

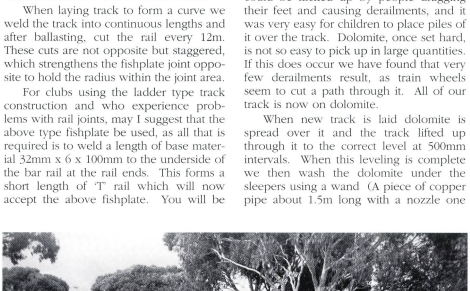
For clubs using the ladder type track construction and who experience problems with rail joints, may I suggest that the above type fishplate be used, as all that is required is to weld a length of base material 32mm x 6 x 100mm to the underside of the bar rail at the rail ends. This forms a short length of 'T' rail which will now accept the above fishplate. You will be surprised at the improved ride and all the other points mentioned.

One other prototype procedure I have adopted is the use of a rail puller. There have been several occasions where buckles have occurred, due to too much rail in a section of track, and of course the remedy is to cut and reduce the length. This I do and after cutting, I use the rail puller to pull the rail. This puts tension on the rail and opens up all expansion joints. After each pull, the rail ends meet and I cut a gap the thickness of the cut-off saw blade. I do this until all the expansion joints within a distance of 18m have opened either side of the joint, then weld up the cut

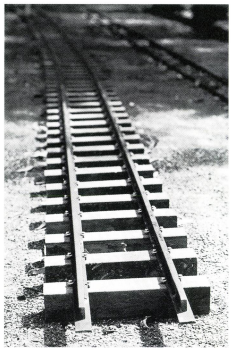
For those who are interested, the puller consists of four cams. Each pair of cams is connected to the other by two narrow plates, the cams being opposite each other, each side and at each end of the cut rail. The two pairs of cams are connected by large turnbuckles so that when they are turned the cams engage with the web of the rail and this force then becomes a pulling force to pull the rails together.

The type of track ballast we use is dolomite. The track ballast originally consisted of small gravel, but again with experience we found it very troublesome as the track moved about during hot weather as if it was sitting on marbles. It would not consolidate to form a shoulder, also it could be kicked up by people dragging their feet and causing derailments, and it was very easy for children to place piles of it over the track. Dolomite, once set hard, is not so easy to pick up in large quantities. If this does occur we have found that very few derailments result, as train wheels seem to cut a path through it. All of our track is now on dolomite.

When new track is laid dolomite is spread over it and the track lifted up through it to the correct level at 500mm intervals. When this leveling is complete we then wash the dolomite under the sleepers using a wand (A piece of copper pipe about 1.5m long with a nozzle one end and a control valve the other). This method reduces the need to bend over when tamping. After this consolidation more dolomite is spread to top up to sleeper level, after about three days the dolomite sets very hard.



Work loco and hopper wagons



12 metre plastic sleepered 'T' section rail track panel

Ballast (dolomite) is dropped and spread over the track by special purpose-built bottom discharge hopper wagons and a ballast plough, coupled to the last wagon. The bogies of the hopper wagons have inbuilt plough blades fitted to the inboard side of the bogies, the blades are fitted $^{1}/_{8}$" above the rail, this prevents derailments when ballasting.

The water supply for washing the dolomite under the sleepers is obtained from two tank cars fitted with an electric water pump to provide pressure. These tank cars are also used for weed poisoning and fire fighting.

One other major advantage in using dolomite is the ability to maintain track cant and cross level, for if it is lost for any reason it is easily regained simply by saturating the dolomite with water then lifting or lowering the track as required. After about three days the dolomite will again set hard.

Plastic sleepers

Our Inspecting Engineer at the time (1987 - 1995) raised concern about train operational safety, particularly the use of power operated remote facing switches and converging tracks where give way to the right was not very safe.

With this in mind I developed a signalling system following the original South Australian Railway practice. However, problems began to arise on two fronts, one the use of the larger sleepers required to contain the new 'T' section track became quite expensive to obtain a suit-

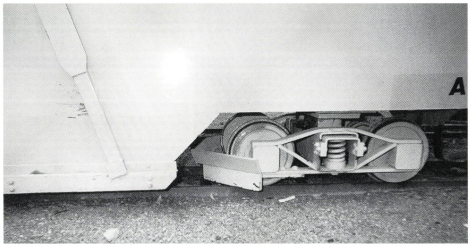
able grade of timber, namely jarrah. This problem was partly solved by the use of Parma-Pine™ as the timber and the use of salvaged railway telegraph pole cross-arms which we brought from the State Rail Authority ex the old Wilunga Line. The second problem arose on signalled sections of track, for when the pine sleepers got wet they caused shorting problems and signal failures. We have also found of late that the Parma-Pine is splitting at the screws and the Tek screws are rusting away in the treated wood.

It was not until 1995 that I saw an advertisement on TV relating to the use of recycled plastic as posts. This I thought was a chance that our sleeper problems may be solved. I contacted the firm Omnipol of Wingfield SA, which I visited, and after some discussion with the owner, he offered a number of posts 70mm x 70mm x 2.4mm. These were cut up to make 46 sleepers 70mm x 70mm x 355mm and used on the track circuited 'T' section track where signals controlled trains converging from double track to single line.

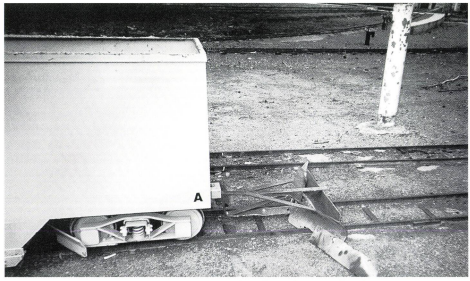
After 12 months trial it was quite evident that this was the way to go. The only change was to the size of the sleeper, reduced to 65mm x 65mm x 355mm so to date our metals are approximately 80% under plastic.

The plastic posts are easy to cut - an ordinary hand saw will do. To hold the 'T' section rail to the sleeper we use 50mm galvanised Tek screws. These screws are driven in with an air gun; to save track panel assembly time all sleepers are pre-drilled with a $\frac{1}{8}$" drill bit and using a four drilled hole track gauge.

Some people may question the size of the sleeper as rather large and unnecessary. I can assure these people that the 65mm x 65mm x 355mm is the minimum. There are two reasons for this. Once again through experience, firstly the weight of the sleepers reduced vandalism (disturbing track) and secondly the larger sleeper end surface area acting on a well built shoulder helps contain the track overall, restricts lateral movement and reduces buckles.



Plough fitted to inboard side of bogie

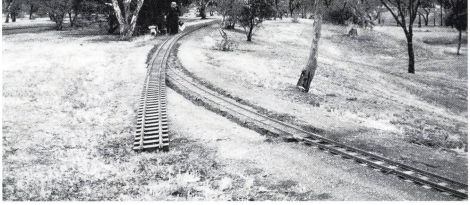


Hopper wagon with plough attached

Other advantages in using plastic sleeper ties are that they are white ant resistant, safe to handle, no splinters, reduced track circuit current loss, no rusting of Tek screws, no twisting or warping, no rusting of the base rail where it sits on the sleeper and they can be re-used several times over without fear of splitting. The UV effect on the tie after 5 years appears to be negative.

I have also trialed plastic culvert abutments in place of wood. These are made from a full size plastic sleeper 2.4mm x 90mm x 200mm. Three abutments are obtained and cut to size 600mm at the top and 900mm at the bottom, being separated by two steel channels 610mm long x 75mm wide and 40mm high, Tek screwed to the top of the abutment with the running rails affixed in the centre of the channel. By using channel it not only provides strength but the added safety of in-built check rails for trains travelling over the culvert. To dates these culverts are holding up so well that all timber culvert abutments will be replaced. All small diameter drainage pipes have been replaced with culverts as the latter block up easily and cannot be readily seen if clear

In closing I would like to point out that I have no engineering qualifications. All of the above ideas have been based on prototype railway practice and my own 40 years of railway experience on the footplate and as a running inspector now retired, so therefore I accept criticism from the professional person.



Plastic sleepered track ready to slew into position

Keep it Simple

A series on using simple methods in the workshop with the beginner in mind

by Murray Lane

Photos and drawings by the author

1. Lining up work in machines with the help of wobblers

A wobbler is a device which is held in the rotating head of a machine, the end of which will wobble when the machine is running. When the wobbling stops, as the end is advanced against the work piece, the position of the centre line of the machine axis can be determined in one direction from the edge of the work piece that the wobbler is touching.

A commercial wobbler set is shown in

Figure 1

Figure 1. This consists of the holder which is normally held in a drill chuck and four auxiliary heads. The ball ends of these clip into a socket in the holder. The free end can be moved around 30 degrees from the central position.

1. The first head end has a point.
2. The second head has a small disk with a diameter of 0.100". This is an imperial set, They are also available in a metric version where the head will probably be 2mm diameter.
3. The third head has a ball with a diameter of 0.250".
4. The fourth head which has a cranked arm, is designed to hold a lever type indicator as shown in **Figure 2**. This allows the ball head on the end of the lever of the DTI to run in line with the centre line of the machine head. Using the lever with the smallest ball (1mm in my set), quite a small hole can be lined up.

Now, let's have a look at the action of head 2. Say you want to locate the edge of a work piece held on the machine table. When the machine is started (a couple of hundred revs will do), the end will wobble around. Raise the work piece, or

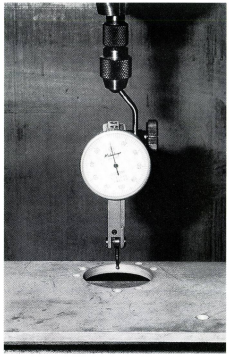
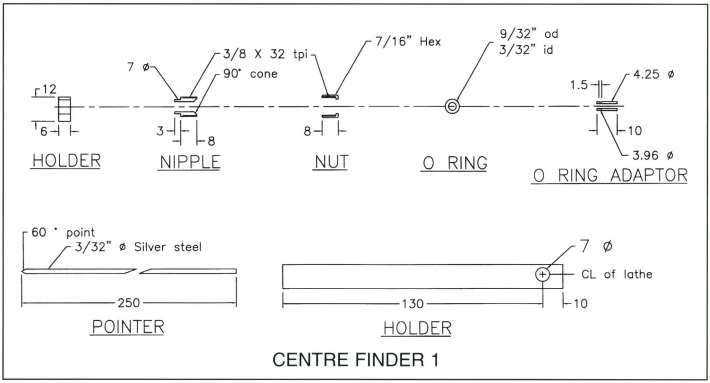
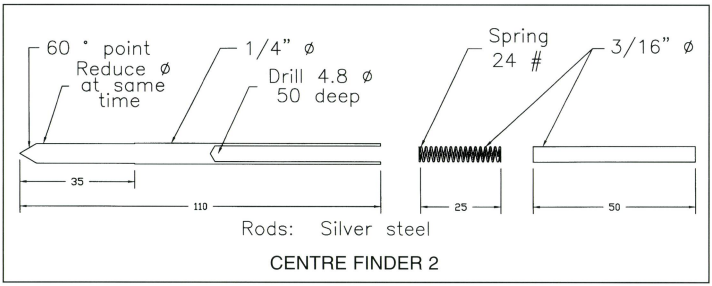


Figure 2

lower the wobbler (if your machine is fitted with a quill), until the end of the wobbler is in line with the work piece edge.





CENTRE FINDER 2

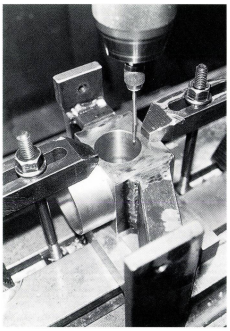


Figure 3

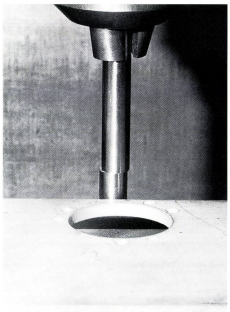


Figure 4

Move the table so that the end of the wobbler touches the edge. The wobble will reduce as the work advances towards the wobbler. When the wobble stops, the head is running true. Note the dial reading. If the job is moved slightly too much, all of a sudden the head of the wobbler will run off, at an angle. There is a certain amount of expertise involved in determining the correct reading, and it may be necessary to repeat the sequence a few times. The difference between running true, and running off is very small, (i.e. less than 0.0005" or 0.01mm). If ½ the diameter of the head is subtracted from the reading this will locate the machine centre line with the edge. By repeating the above from an edge at right angles to the previous, it is possible to locate the centre line of the machine to any point on the work piece, by moving the two slides the amount required and using the lead screw dials. If the machine is fitted with digital read outs the job is even easier.

The centre of a hole can be located in exactly the same way. Sometimes it is necessary to rebore a bearing hole in a work piece after it has been welded. The above method is used to align the boring head in the correct position. Refer **Figure 3**. A point to remember with this type of head is that the head length needs to be reasonably short, or to have a barrel shape. If the head is long (i.e. more than 1mm) a false reading could be obtained if the head does not run true.

There is another type of simple wobbler which works in the same way. This is a cylindrical bar with a head which can move slightly off the centre line. It is shown in **Figure 4**. This has the advantage that it does not run off wildly like the previous unit tends to do.

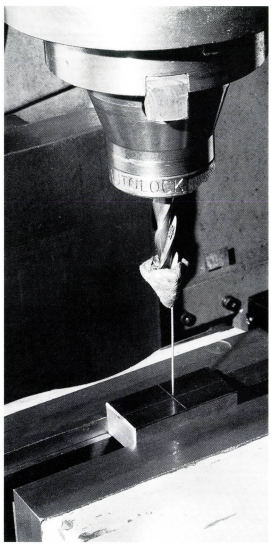
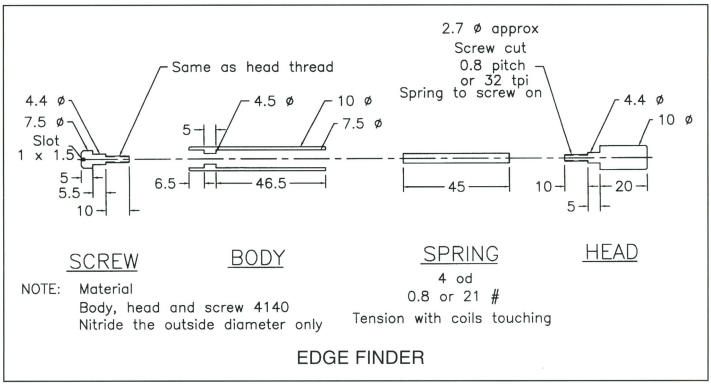


Figure 5

The number 2 head with the .250" ball end is trued with the end of the finger and then coated with bearing blue. It is then brought up to the edge until the bearing blue coating is just disturbed.

The number 1 head is used to position the centre line of the machine in line with either a centre pop or a couple of inter-



secting lines scribed on the work piece. Run the machine as before and centralise the end with your finger to stop the wobble of the point. The point is now running true with the centre line of the machine and it can now be used to line up the two lines or the centre pop by moving the slides as required.

A much quicker and more convenient method of doing the above is to use what is known as a sticky pin. This is a household needle held on the end of an end mill or a drill, by a lump of plasticine. It is common practice to have the needle embedded in the lump close to the machine, and to stick it on the end of the cutter when required. The needle is trued up as above and then used to centre the lines under the point. Refer to **Figure 5**. Being finer than the previous device above, it is easier to line up. The only problem seems to be that modern plasticine has more memory than the old type and it is some times hard to completely remove all of the wobble at the needle point. In this case it is still easy to centre the small wobble over the centre of the crossed lines. This is a more convenient system to use as the cutter does not have to be changed, and the needle is always available to use at a moment's notice.

We now turn our attention to centring a centre pop mark on a work piece held in a four jaw chuck, using a centre test indicator. This is a common requirement when using a lathe. In this case there are two types of wobblers that can be used.

1. The simple version is shown in **Figure 6**, which is normally mounted in the tool post. In the most basic form, this consists of a thin rod suspended in a 360 degree swivel, at say 1/10th of the distance from an end with the point on it. This point is moved into the centre pop mark and the work piece is pulled around by hand. The long end of the lever will amplify the movement of the centre pop from the centre line of the machine by a factor of nine times. By using a centre in the tailstock as a reference point, it is a simple matter of adjusting the chuck jaws until the circular movement is reduced to a minimum.

2. Another simple gadget which achieves the same thing is shown in **Figure 7**, but this time a DTI (Dial test indicator), is also required. It is capable of much greater accuracy. This has a spring loaded plunger with a 60 degree vee point on the end. A centre in the tailstock is used to press the point into the centre pop mark via the internal spring. The DTI is now mounted on the cross slide with the end of the DTI plunger touching the centre line of the wobbler, close to the work piece. As the machine spindle is pulled

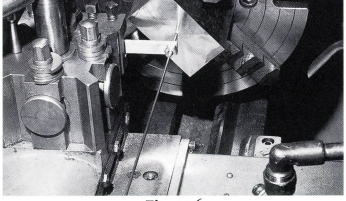


Figure 6

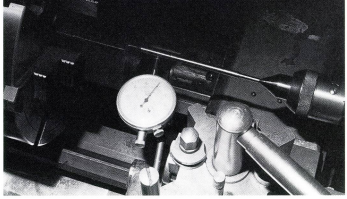


Figure 7

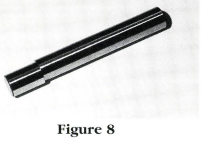


Figure 8

around by hand, the high and low readings of the DTI are noted opposite the chuck jaws. Adjust the appropriate jaws to halve the readings and repeat until the DTI reading does not change.

Details of the construction of the **simple edge finder** are shown in the drawing. Sizes are not critical but are from the one I have. The head will have about 0.8mm side play and is pulled onto the body by winding the spring onto the threads. Have a trial fit to see if the lengths are OK before hardening. The parts could be made of silver steel but the threads would be very weak. Endeavour to make the head diameter as near to 10mm or some other standard size and with a good finish, as this measurement will affect all future measurements on the job. The faces of the body and the head where they are in contact also require a good finish. Only the outsides of the body and the head, and the contact faces require hardening. When ready for final assembly, Loctite® the spring into the threads. The assembled unit is shown in **Figure 8**.

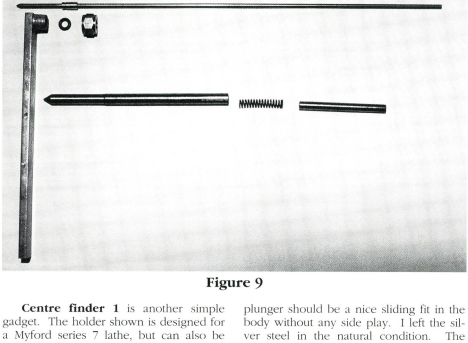


Figure 9

Centre finder 1 is another simple gadget. The holder shown is designed for a Myford series 7 lathe, but can also be used in a lathe with a quick change tool holder with adjustable height. Make this to fit your lathe and drill the 7mm hole with the bar mounted in the tool post. Once again sizes can changed to suit personal requirements. All materials apart from the pointer and standard O ring in my version were made of scrap brass and it only took about an hour to make.

Centre finder 2 is even easier to make but you will need some form of DTI. The drawing is self explanatory. The plunger should be a nice sliding fit in the body without any side play. I left the silver steel in the natural condition. The parts of these centre finders are seen in **Figure 9**.

If any reader is interested in the first type of edge finder described, there are a couple of articles in the *Model Engineer*. A letter by N Walford on pages 1033 and 1034, issue number 3451, in 1972 Vol 138, gives a drawing with dimensions and brief instructions. A typical article is written by G Thomas in 1977 Vol 143, issue numbers3566 and 3567, pages 878 to 882 and page 945.

Steam Chest

with Dave Harper

Hi there, steam fans, and welcome to another condensation of steam stuff. I've got a fair bit of feedback to share with you this time, as well as some new information.

More on Maudsley

Firstly, an addition to the piece on Maudsley's valve gear in *Steam Chest* issue 93 (Nov/Dec 2000) from Dave Muddiman who sent the following email:

'Re-reading the details of the Maudsley valve gear reminded me that while we were in England I came across another pinion based gear used by Webb's in some of their industrial locos of late 19th century. It consisted of a cross shaft with cranks at either end to drive the valve rods. A spur gear was mounted on the shaft and could move laterally along a short length of 'lazy thread' keyway. Movement was achieved by a fork connected to the reversing lever.

The spur gear was meshed with a long pinion on the driving axle. When the reversing lever was activated it moved the spur gear along the long pinion with which it was in constant mesh, but through the action of the keyway, moved the position of the valve cross-shaft relative to the driving axle.'

Dave wonders, as I do, if anyone has come across this form of valve gear, and if so, what was it called?

Aveling and Porter roller photograph update

Frank M Mitchell from the ACT wrote to me about the photo of the Aveling and Porter steam roller in *Steam Chest* Jan/Feb this year (Issue 94) as follows:

'Regarding the photo submitted by Gordon McMillan, a little search of the '*Sands & McDougal Directories*' of Victoria in 1901, 1911, 1916 and 1920 revealed the following:

Looking at the commercial business names of the premises in the background tells us that Arthur A Leckie, Ironmonger and Charles Eastwood, Hairdresser were at 6 Sturt St and 1 Greville St respectively in Ballarat between c1916 and 1919. In other words this locality could be expressed as 'the dip at the bottom (east) end of the main (Sturt) street. Sturt St narrows here to become Bridge St, Ballarat East.

By 1920 A A Leckie had become Leckie & Sneddon, Motor Mechanics.

I trust this is of some interest to others; it was to me, being a descendant of the 'Ballarat Diggers' from 1862.'

Well, I certainly found it interesting, and I'm sure many of our readers will also. At least now we have a location and approximate date for the photo. Thank you very much for your interest, Frank! Maybe this will trigger someone's memory in Ballarat?

John Symons' rotary engine

Following my request for more details of the rotary engine which John Symons developed from the "Rev Dyson's" rotary valve engine, (as mentioned in *Steam Chest* last issue) John has kindly sent me a set of drawings for this intriguing little model. These have been forwarded to our editor, and will hopefully be used as the basis for a stand-alone article on this model *(It's being prepared...Ed)*. Thank you very much for the time and effort, John.

More on gears

As mentioned last time, I went hunting for a gearbox out of an old Simpson washing machine, on the advice of the same John Symons. Well, one of our local washing machine fixers seemed only too happy to let me take away a complete gearbox. When I fronted up at his yard he presented me with a plastic drum about 12 inches in dia and about 8 inches deep with a shaft sticking out top and bottom. Said drum was three quarters full of oil, obviously not an easy item for him to dispose of.

Getting the thing home, I set about emptying and dismantling it. After about an hour and many swear words, I finally managed to extract two sets of beautiful, hardened steel gears which will be ideal for a model geared steam winch! These gears were held on with various circlips, so I had to regrind the tips of an old pair of round nose pliers to fit. Having proper inside and outside circlip pliers would make the job much easier. However, this proves the point that these gears are available out there, for the asking. Apparently the Simpson model 144 and 146 had similar gearboxes, so these are the ones to ask for.

I haven't got around to photographing the gears, but the sizes are as follows: the first pair are helical gears, the small one being 27mm OD x 17mm wide with 21 teeth. The mating gear is 70mm OD x 15mm wide with 59 teeth. This gear is machined as one with a spur gear 17mm x 23mm having 15 teeth, and the final gear is 80mm x 20mm with 51 teeth. I'll let you work out the final reduction.

The small helical gear has a splined bore of about 15mm, but is should be possible to make a brass bush to press into this. There is also a flange about 40mm dia on one side of this gear which could be ground off if need be. Having touched this gear on the grindstone, it certainly behaves like very hard steel and I would hesitate to try turning it. Maybe with tipped tools it would be possible, but I certainly won't be trying it on my baby Myford!

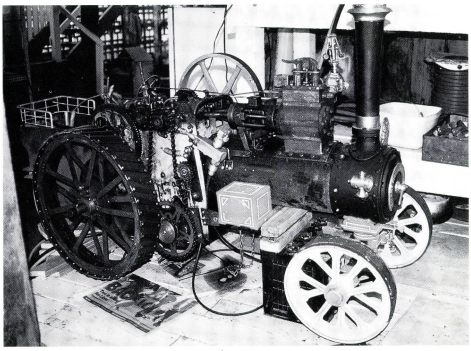


Photo 1

But wait, there's more!

Just to keep things rolling, at about the time I acquired the gearbox I had a visit from a local modeller who prefers to be called just Hank — I think he has an unpronounceable Dutch name. Hank brought with him some photos of the models he's made over the years, but also offered me the pick of a whole pile of old spur gears he had collected when he worked for a machinery manufacturer. As a result of my return visit to Hank's place I now have a second set of spur gears very similar in size to the set just described, so I'm set for geared winches for a long time to come.

Hank originally called me to seek information on electric motors and speed controls to suit a model freelance traction engine that he's built, see **photo 1**.

Realising that his boiler would never pass the necessary tests, Hank decided to mount an electric motor in the firebox and power the TE with that, using a car battery in the tender. The drive will be via the large sprocket and chain visible just in front of the rear wheel in the photo.

I was unable to give him any real advice, his needs being far removed from my experience with *Red Fred*. I'd be happy to pass on any advice that our readers have to offer, bearing in mind that he is a pensioner and running on a very lean budget, like many of us.

As a ride-on wagon to follow his TE, Hank is building a large scale Monmouthshire Wagon, using his 1/8 scale model as a prototype — see **photo 2**. This is quite an impressive effort, and the small model is really well done. I know how it is to build these model horse-drawn vehicles as I have an unfinished model of the same wagon among my souveniers!

Photo 3 shows Hank's beam engine generating set, all built from a couple of photographs, quite a few years ago. When he asked me why I thought the piston rod seemed to lock up on TDC. I took a closer look and noticed that he'd forgotten to fit the outer set of radial links of the parallel link motion. He quite reasonably said that he couldn't see them in the photograph he worked from — despite that, it's quite a well-made model.

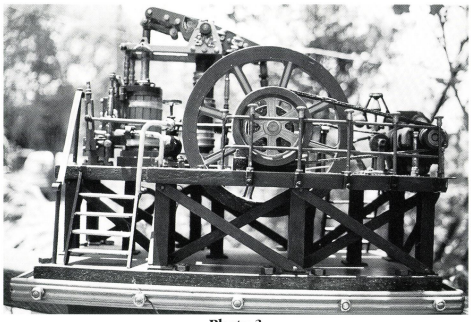


Photo 3

Even older is the twin cylinder piston valve engine in **photo 4**. Hank has forgotten what he based it on, so if anyone out there recognises it, we'd love to know.

A model steam crane

Our regular correspondent, John Single recently sent me photos and details of a neat steam crane he built for his grandson a year or so ago. It is based on the O B Bolton plans but with a few mods — see **photo 5**. The single oscillating cylinder of $^{7}/_{16}$" bore x $^{3}/_{4}$" stroke can be seen, and is as per the drawings. On the other end John has engineered a clutch so the drive can be disconnected from the drum, a very neat idea. This was done by squaring the end of the crankshaft and by filing a matching square in the bore of the pinion. The pinion has a disc attached to it so a lever can move it along the shaft and out of mesh.

The jib of the original is a lattice structure, which looks very nice but, as John says, is a lot of work. So he made up two channels out of 18swg steel with spacers between. This still looks the part, and apparently the grandson never complained! Also visible in the photo is the spirit burner and its funnel, and peeping from behind, the garish yellow plastic gears that come with Meccano sets these days — none of the nice brass gears that we remember!

John has also sent me a couple of old pencil sketches he made many years ago of a winch and a capstan — more information for the folder. Thanks, John, keep up the good work.

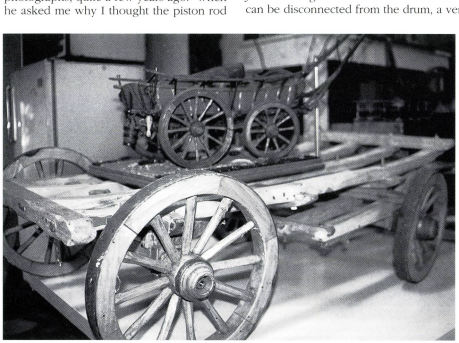


Photo 2

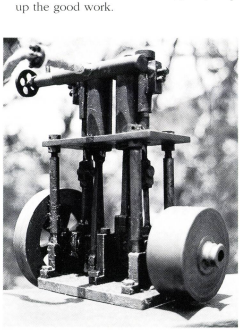


Photo 4

Hydraulic Network

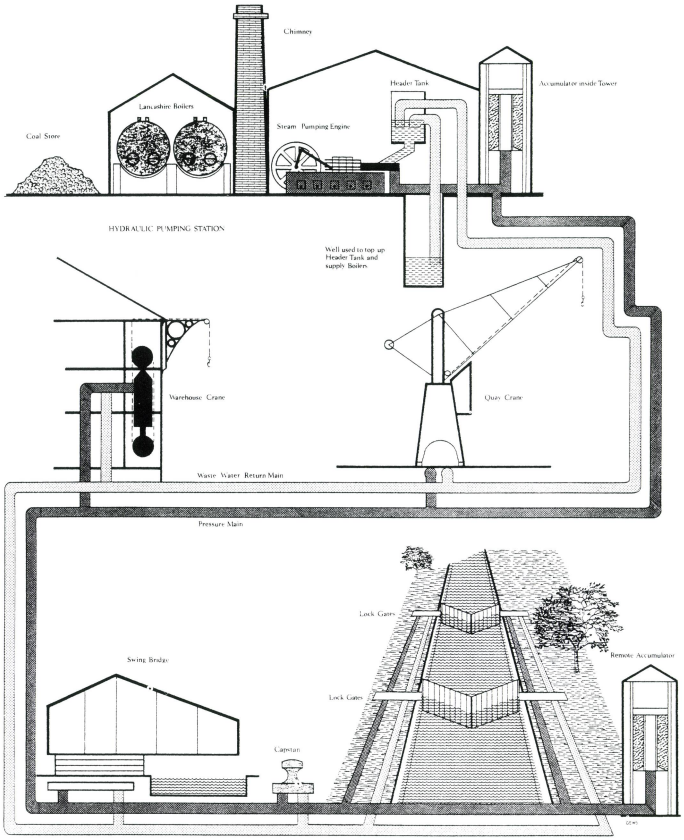


Figure 1

Still more on hammers

Yet more information has been sent to me by Robin Grogan from Victoria, found as he was browsing through his set of *Newnes' Engineering Practice*. There is a whole chapter on the operation and maintenance of power hammers, this time really steam hammers, although pneumatic hammers do get a mention at the end.

Robin tells me he bought the 4-volume set a while ago, but found they weren't what he wanted, so is interested in selling them or trading for a copy of *Wilson's Engineers Handbook* or a metric version of *Machinery's Engineers Handbook*. Anyone interested can contact Robin by emailing him at

robin.grogan@origin.net.au

or via the editorial office.

When I read Robin's letter, I headed for my set of *Newnes' Complete Engineer*, where I found the same article, word for word. Both our sets obviously date from the same period, some time in the 1930s. They are full of good information, but I had completely forgotten the chapter on hammers was in there.

Thanks to Robin for jogging my memory, I have another set of information sheets on file — five 49c stamps would bring you the 10 A4 pages if you're interested.

History and hydraulics

Browsing in my local council library recently I found a book titled *Dockland*, an illustrated historical survey of life and work in East London. As both my wife and myself were born and bred in that area, this seemed a book worth reading — and it is! Apart from detailing the rise of the London docks through the 19th Century to the dramatic closures of the 1970s and 80s, due to containerisation, there is a complete chapter on the hydraulic machinery used in the docks. This ranged from capstans and cranes up to dock gates and swing bridges, and was very widely used between 1850 and 1900, when gas engines and electricity started being introduced. Prior to that the water pressure for the hydraulic mains was created by using steam pumps to pump water into accumulators. These were vertical cylinders with a plunger in the top from which heavy weights were suspended. These weights provided the pressure, and mechanisms at the top and bottom of the plunger's travel turned the pumps on and off as required. **Figure 1** is a diagram of a typical hydraulic network and **figure 2** shows the accumulator in more detail. These diagrams are taken from the book and are typical of the quality of the illustrations in this excellent book. For anyone with an interest in the history of what was the world's most important shipping centre this book is well worth looking out for. *Dockland* was published by North East London Polytechnic in 1986, ISBN No 7168 16113.

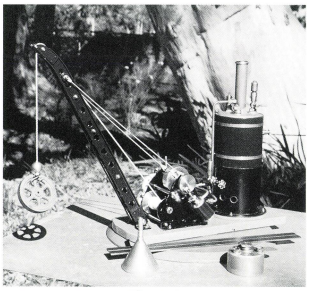
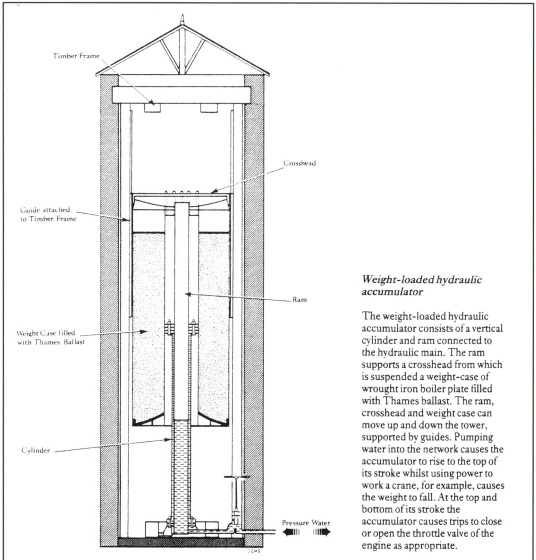


Photo 5

Needless to say the chapter on hydraulics in now in my papers file.

We seem to have covered a sufficiently wide field for this time, until next time, happy steaming!



Weight-loaded hydraulic accumulator

The weight-loaded hydraulic accumulator consists of a vertical cylinder and ram connected to the hydraulic main. The ram supports a crosshead from which is suspended a weight-case of wrought iron boiler plate filled with Thames ballast. The ram, crosshead and weight case can move up and down the tower, supported by guides. Pumping water into the network causes the accumulator to rise to the top of its stroke whilst using power to work a crane, for example, causes the weight to fall. At the top and bottom of its stroke the accumulator causes trips to close or open the throttle valve of the engine as appropriate.

Figure 2

Remember —
You can email Dave at
sandave@bytesite.com.au

Six of the Best (plus one for the pot)

A handful of workshop 'quickies' from Les Brown

Photos by the author, drawings for publication from the author's originals by Peter Hall

Here are a few workshop devices I have made, all of which are very basic and do not need step by step instructions.

1. Fruit tin lubricator

For those without benefit of a suds pump (includes me) who don't mind a 'total loss' approach to their soluble oil, the answer is a fruit tin. Drill a hole in the base, insert a small brass gas tap (solder or screw) and attach a short length of clear plastic hose to the outlet. Paint the tin inside and out to delay corrosion and hang it with thin wire from a support above or near the work and you're in business.

2. Hacksaw blade keeper

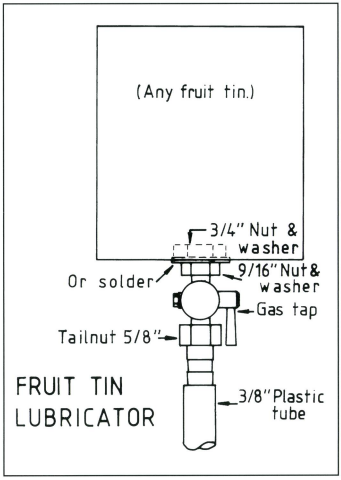
Hacksaw blades, for me, are like sticks of dry lube and policemen — never around when I need one. When, finally, I do find a new one, gravity and humidity have done their work. It is found at the bottom of the last box I'd imagine it to be in and said box is resting in a damp spot. The blade, now suffering terminal rust, mocks me from the dark interior. The response was a short length of that orange plastic conduit electricians use to conceal their work. I bunged it at one end with an old bolt and drilled a wire hanging hole at the other.

The outside is labelled in black felt tip and the whole now hangs by a nail above head height with the blades safe inside.

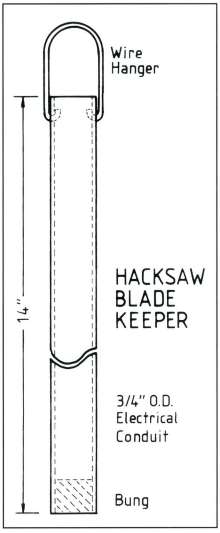
3. TT14 Tin opener

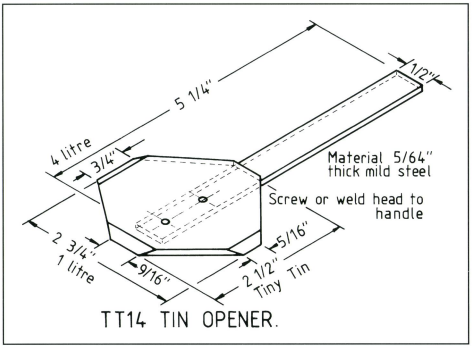
The ideal gadget, years ago, for opening paint tins was a flat 'T' shaped key used to release the seals on jars of baby food. No longer available, this is my substitute. It is a short flat handle, to which is added a flat head with three different sized 'keys' cut and ground upon it. I used a piece of scrap 5/16" MS sheet, but any thickness that is stiff enough in action will do. The three keys are cut and ground to a chisel edge in the following approximate sizes:- 5/16", 9/16", 3/4" and correspond to paint tin sizes:- 'Tiny tin', 1 litre and 4 litre. It is used in the same way as a screwdriver on the same mission, but requires less effort, doesn't 'skid' and leaves the lid undamaged. I use the 4 point opening routine — 12pm followed by 6pm, 3pm followed by 9pm. It is seldom necessary to do a second 'circuit'

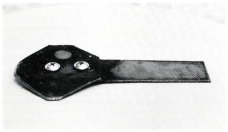
The fruit tin lubricator



Hacksaw blade keeper

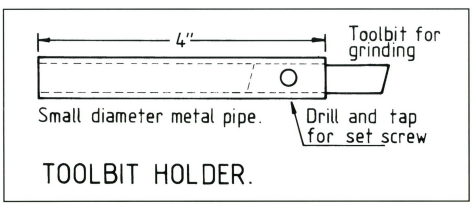






TT14 tin opener

Toolbit holder



4. Toolbit holder (offhand grinding)

Benchtop lathes use small HSS toolbits that heat rapidly when offered to the bench grinder. To avoid burnt fingers, blue toolbits and unwanted additions to the parrot's vocabulary, quenching before completion of that particular 'facet' is the usual outcome. If the toolbit is not then offered to the grinder at the same angle as before, a second facet/bevel appears. It gets worse. The cycle repeats itself until the result is a multi-faceted 'gem' that has lost all resemblance to a cutting tool. It is cheaper, by the way, to practise on small MS offcuts than HSS tool-blanks until you get your hand in. How, then, to grind a complete facet in one pass without succumbing to the 'dropsies'?

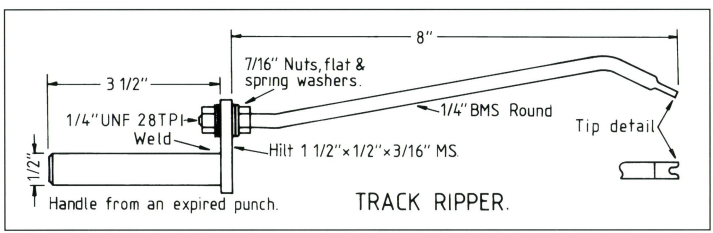
The answer for me was to use a small tap-wrench to grip the toolbit blank during grinding. The lathe's own toolbit holder (if it has one) could also be used — keeping it well clear of the wheel, of course. A short length of small diameter metal pipe would do just as well. Just drill and tap a hole for a set-screw to grip the toolbit at one end.

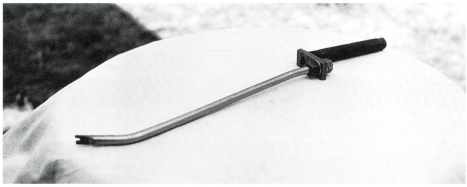
5. Track Rippa

Some 'N' gauge track needed to be lifted in a hurry and my old method with thin-nosed pliers was decidedly slow. I wanted the minimum of damage to the track and the bench-top (and saving track-pins for re-use was also desirable). A rummage in the bits box produced a broken punch that became the handle. The rest is a slightly feminine version of a pinch-bar in miniature. It uses 1/4" BMS rod with a small MS offcut that becomes the hilt. The handle is welded to the hilt and the rod is bolted to the other side in an offset position. It can be removed at will and replaced by other purpose-made 'bits' requiring an offset handle. The tip was forked and shaped using a cutting-wheel in a hand held angle grinder. This version lifts track very well.

6. Welding gussets

Small offcuts of flat bar are very useful as packing pieces and as components in small fabrication jobs. However, like wire hangers left in a dark cupboard, they do tend to multiply. Before consigning the surplus to the garbage bin you could consider creating a small stockpile of welding gussets. I have found them invaluable in 'stiffening' certain fabrications, large and



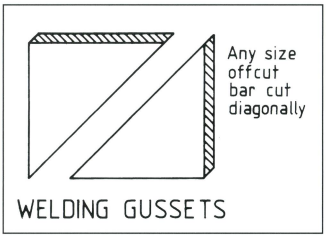


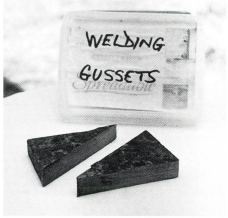
Track rippa

small. Their reinforcing strength is out of all proportion to their size. Assuming the edges of your offcuts are still square and parallel, mark in the diagonal in thick felt-tip. Cut in two along the diagonal to make a matching pair of right-angled gussets (I use them mostly in pairs). Keep doing this until you get fed up.

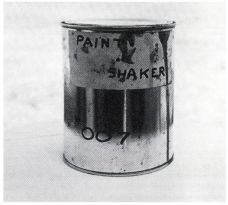
6a. '007' Paint applicator

Small parts can be a nuisance to paint by hand (also messy) and seldom warrant the use of spray gear. My solution was a 1 litre paint tin. Put in a small amount of the desired colour and some quick drying thinners — a thinner mixture than for spraying, but you'll need to experiment. Toss in the bits and close the lid. A gentle tumbling action by hand (like a vodka martini, James, shaken, not stirred) for a very short time is enough to coat the parts all over. Open up, strain the contents and save the mixture for a repeat if needed.





Welding gussets



'007' paint applicator

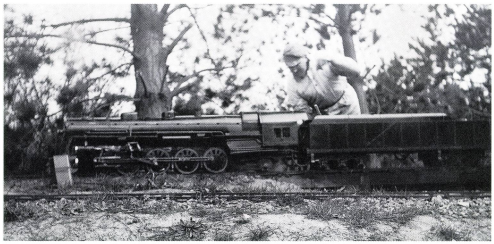
Separate the parts so they don't stick and let them dry. Now that you've done all that, take a break, you've earned it!

Hales Creek Railroad — A Bit of History

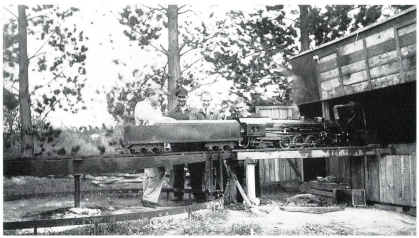
Story and photos supplied by Tim Dunlop

It all began in 1943 when a live steam enthusiast was visited by the members of the Victorian Pacific Rail Road Club. One of the members of the VPRR, 'Robbie' Robinson was a draftsman at a factory in North Melbourne where the foreman, Roy Hughes mentioned that he had a 6" gauge Canadian Pacific 4-6-2 live steam loco running around his back yard. A visit was organised, and was thoroughly enjoyed by all to the extent that such visits became a regular monthly feature of the club's activities. At one of these visits, Roy advised that he could obtain the use of about two acres of orchard at East Burwood, should we be interested in building a track on such a large area of land. All the members paid a visit to the property and met the owners, the Hales family.

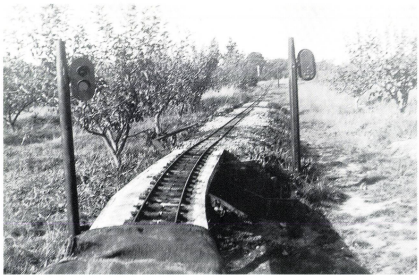
After some discussion, it was decided to proceed to build a track for both 2½" and 6" gauge. The original members of the group were Roy Hughes, Tim Dunlop, Ernie Dean, Les Baxter, Bill Newman, Wally Hales and shortly after, his brother Alan and Tom McGreavy. On 13 August 1943 the property was surveyed and the track location determined. Work commenced on the formation and the making of sleepers, which were 9" x 2" x 1" hardwood, slotted in a milling machine to take ¼" x 1" black mild steel rail.



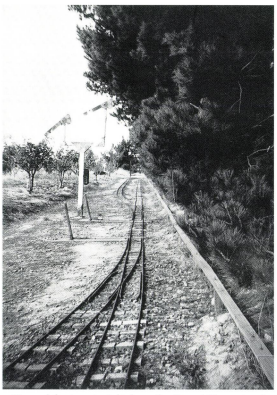
Roy Hughes (builder) with the Mohawk on the shed road



Mohawk on the turntable and shed road, with from left, Roy Hughes, Wally Hales and Tim Dunlop



Gradient down the bottom straight, commencement of the trestle bridge, colour light signals and lower level crossing and sign.



View of the top straight from the Round House track

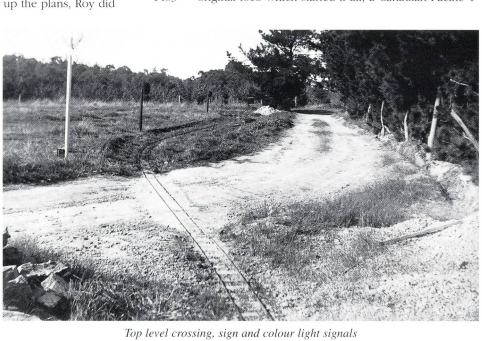
"This 6" gauge layout comprises of 800 feet of main line in which is incorporated a 100 feet bridge of wood and concrete, 3 feet high on a 60 feet radius curve over its entire length. Leading off the bridge is an embankment covering the next 100 feet; this leads into the points and run-off track to the turntable and roundhouse, etc. From here the track traverses a 4% gradient that is equipped with an over 80 feet passing loop. A level crossing over a private roadway leads into a cutting 300 feet long and 5 feet at its deepest point, creating a 1.1% gradient. This cutting forms the opposing radius to the bridge. This stretch also has an 80 feet passing loop running parallel to it. A comprehensive electrically operated signal system allows operations to be carried on at night."

Locomotives in use were:

- 1483 — original loco which started it all, a Canadian Pacific 4-

Roy wished to make a larger loco to suit the 800 feet of track and after looking at the *Model Railroader Encyclopaedia*, decided on a New York Central 4-8-2 Mohawk. At Tim's suggestion this was built to 1½" to the foot scale (as was the 0-4-0 which followed it). It was a team effort as Tim drew up the plans, Roy did all the welding and machining, Tom (who worked at a foundry) did all the castings and Wally and Tim did a lot of the sheet-metal work. The boiler was made from a section of tramway pole and hydraulically tested to over 500 psi. When it was being tested, it was noticed to be creaking a bit — the gauge had stuck at 230 psi. When Roy tapped it the needle spun around very smartly, and the pressure was released just as smartly.

Every Sunday was spent at the track, which finished up as a large oval with two passing loops on the long sides, a water tank and a turntable at the engine shed and both semaphore and electric signalling with the wires running in a wooden conduit. The 2½" gauge locos of Bill Newman and Les Baxter could not cope with the grade so a decision was made to remove this rail from the track. A 1952 description of the track read:



Top level crossing, sign and colour light signals

Wally Hales on the 0-4-0 switcher

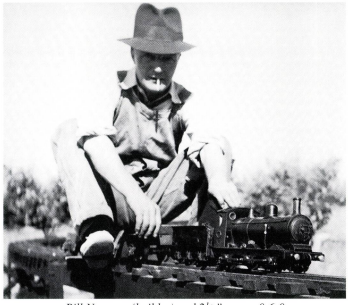
6-2, built 1943 by Roy Hughes, cylinders 1½" bore x 1⅜" stroke, Walschaerts valve gear, 6" driving wheels and charcoal fired.

- 6146 — New York Central Mohawk 4-8-2, already mentioned, cylinders 1⅞" bore x 1 11/16" stroke, Baker valve gear, 8½" drivers and charcoal fired. One of its best performances was a run of 10 miles in one hour with a crew of three, all fuel and water carried, a total of 67 laps non-stop. This represents a scale speed of 80 mph.
- 9846 — Built as a club effort for the 1946 All Models Exhibition in Melbourne, it is a Baltimore & Ohio switcher 0-4-0, cylinders 1½" bore x 1⅜" stroke, Stephenson gear, 5½" drivers and charcoal fired.

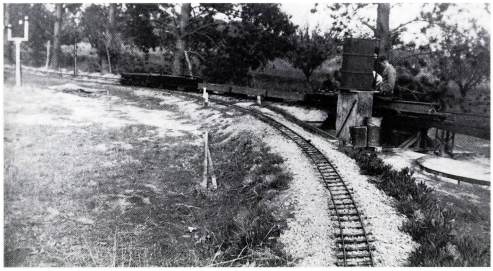
Of the original members there are three survivors — Ernie Dean and Tim Dunlop both model in HO and Les Baxter still has 5" live steam in the form of a VR A2 and a narrow gauge loco running in his rather large backyard.

Judith Hughes, Roy's daughter on the Pacific

Unloading the Pacific, from left, Roy Hughes (builder), Wal Hale (junior) and Tim Dunlop (back to camera). This shot really does set the time period quite graphically.



Bill Newman (builder) and 2½" gauge 0-6-0



View of the round house/turntable/water tower with the Mohawk in front, Pacific in the rear.

Got any interesting items on the early days of model engineering in Australia or New Zealand . . . Why not share them with us?

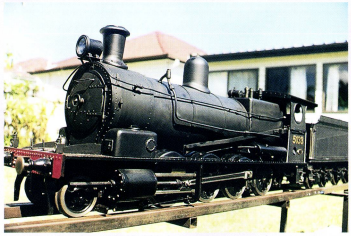
One Man's Models

Neil Matherson

Photos supplied by Neil Matherson

Neil Matherson is a member of the Western Districts Live Steamers whose track is at Fairfield West in Sydney. Here, for your enjoyment, is a sample of his work which includes the unusual, like loco 1033 which is a dummy water carrier for loco 1304 (see the last photo).

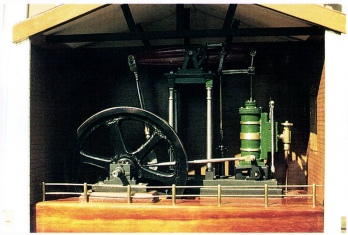
This NSW D50 class (5133) in 5" gauge was built more or less to the plans produced by Ernest Winter



Another shot of 5133. This locomotive is a good passenger hauler at Western Districts Live Steamers

1304 express tank, a good fun engine but not a great hauler. It was also built to Ernest Winter's plans but has been heavily modified.

1½" scale Burrell traction engine with driving trolley. When the water tank seat is fitted it is easier to drive (especially after the lawn is mown).



Scratchbuilt beam engine all fabricated from the scrap box except the flywheel. It is a good display engine running on compressed air from a sealed unit refrigerator compressor.

Double heading tank engines at WDLS. " The 1033 driver is lazy and will not work because I do not pay award wages".

We would like to show your work!

If you have some good colour photos of your models send them in so we can all have a look.

Sharing is part of the fun!

Red Fred's Motive Power

The 'A' Wagon

Story and photos by Dave Harper

As mentioned in the previous article on *Red Fred*, the QR diesel railmotor, I decided early on that it would be much easier to hide the power and control components in some form of goods wagon which would be 'towed' behind *Red Fred*. The question then became 'What kind of goods wagon?' Reading the articles from the *Sunshine Express* on the railmotors and their use all over Queensland, there was evidently no common kind of wagon that was used. All kinds of vehicles were pressed into service, cream vans, horse boxes, open wagons etc.

It was while discussing the problem with Neil Mackenzie that the logical solution presented itself. Neil told me he had a copy of the drawing of the original four wheel goods van produced for QR, known as the A wagon. (See **drawing** on next page). This gave me enough information to at least make something that looked right, as none of the original goods trailers have survived.

There are some passenger trailers still extant, see the picture in *The Real Red Fred* (last issue) of the 'motor and trailer set at Rosewood. There is also still one in use with the *Gulflander* on the Normanton to Croydon Railway I believe. However, these would be no better than the railmotor itself for hiding the 'works', so I settled on the A wagon.

As I wanted to get the whole setup operating in time for the 2000 AALS Convention due to be held at nearby Warner, I also wanted to keep the pusher part of the project as simple as possible. As **photo 1** shows, there's nothing fancy about it at all! The piece of bent wire looping along the side is the radio antenna support in its travelling position. In use the wire is unhooked and stands straight up by the rear corner of the wagon. This gives the radio sufficient range to run anywhere within sight. It started life only half that length, but on the first day's running at Warner, I found that as the set ran underneath the footbridge on QSMEE's elevated track, the receiver 'glitched' causing the speed control to blow its fuse every time! Raising the aerial that much further cured the problem completely, and I've had no radio troubles since. More of the radio installation later.

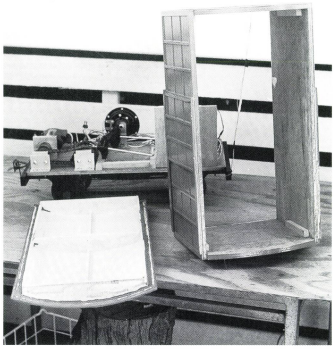


Photo 2

Bodywork

As can be seen in **photo 2**, the body is simply a ply box with glue blocks reinforcing the corners and strips of timber glued to the outside to represent the original panelling. Lines were also scribed along the sides to represent the planking.

The roof was built on a frame consisting of three formers and three longitudinals. 1" wide strips of 4mm MDF were glued and pinned to these after the edges had been sanded to a matching bevel on

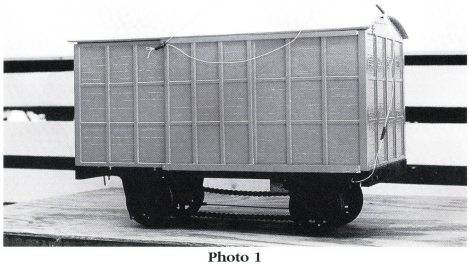


Photo 1

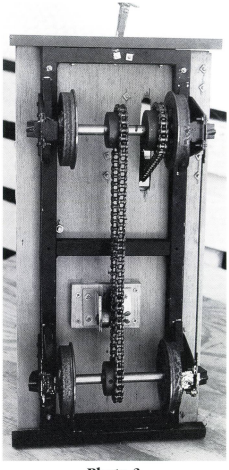
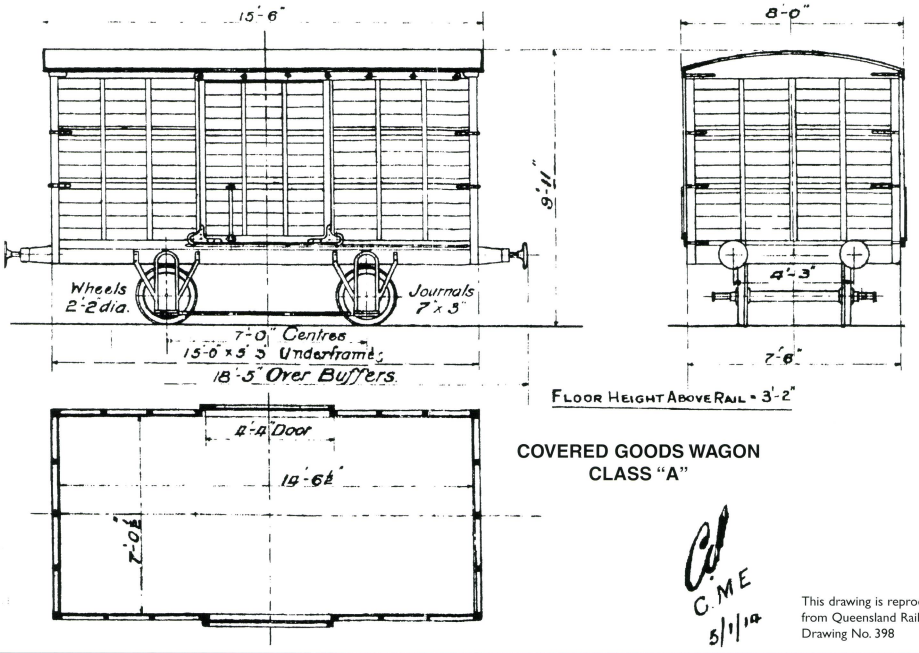


Photo 3

QUEENSLAND RAILWAYS



COVERED GOODS WAGON CLASS "A"

C.M.E. 5/1/14

This drawing is reproduced from Queensland Railways Drawing No. 398

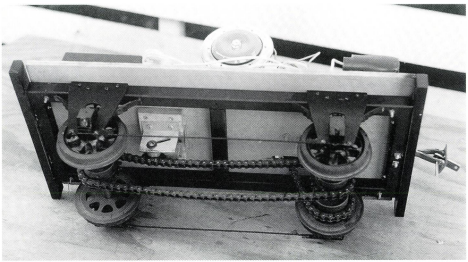


Photo 4

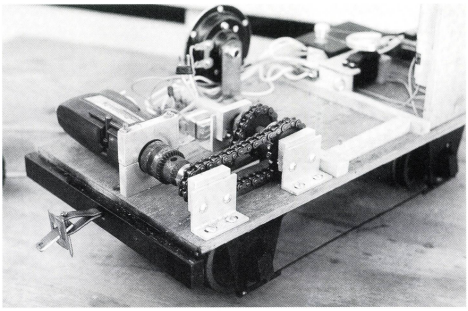


Photo 5

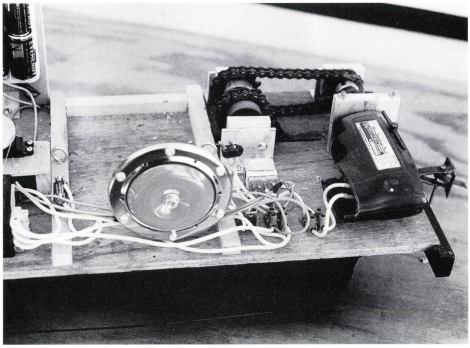


Photo 6

the belt sander.

After trimming the roof was sanded to as near a true curve as possible then covered with caluminiumco as per *Red Fred*. Both the body and the roof simply sit in place, no fixings have been found necessary.

Underframe and wheels

Photos 3 and 4 show the simple 20 x 20 x 1.6mm RHS frame, again welded by my friendly neighbour and his MIG welder. I opted for very basic W irons to guide the axleboxes, as these were used on some early QR wagons, and looked easier to make than the usual W shaped irons. They were cut from 3mm steel sheet. Four nuts and bolts hold each W iron in place.

I went to see John Strachan of Hobby Mechanics for the wheels which I think are A10 tender wheels. John also supplied the axlebox castings, standard QR goods pattern as used on *Red Fred's* front bogie. Machining these was much easier and quicker, as I now have a mill/drill.

Not being a purist I followed Ken Saunders' advice and left only the inside flanges to guide the axleboxes, making machining much simpler. The axle holes were drilled slightly over depth and an oil hole drilled in from the outer face.

The wheels were machined to AALS narrow gauge standards and Loctited® to the axles. This was done fairly late in the process as the sprockets had to be fitted first!

I was advised to buy standard $\frac{5}{8}$" pitch chain and sprockets as these were supposedly cheaper than $\frac{1}{4}$" pitch ones. They still weren't cheap! I wondered why the builder of the tram loco featured in AME a while ago went to the trouble of making his own sprockets to use bicycle chain — now I know! Unfortunately I didn't find out until it was too late.

The sprockets are secured with a 3mm grubscrew to the axles, supplemented by some Loctite® after a couple had slipped.

My new milling machine came in handy for cutting the angled slot in the aluminium angles that support the tensioning idler, as can be seen in **photo 4**. The chain is left a little slack to allow the axles to move on the track.

The buffer beams were cut from some good solid hardwood I had, and support the body as it sits over the floor. The buffer-coupler passes right through the buffer beam and pivots on a bolt through the RHS frame. Slotting the latter was another job for the mill.

The floor was made from the same 10mm exterior grade ply as the body, and provides a firm base to mount all the works inside.

The motive power

One of the great advantages of building *Red Fred* to be remote controlled is that he doesn't have to pull any people around! This considerably reduces the power required and means that quite a

small DC motor and speed control would be adequate. This took me right back to my model boat technology.

Some time ago I had been given a small battery drill sans battery, and I realised that this was the ideal power source as it contained a good set of reduction gears already built in. A quick strip down and test with a 12v battery proved the motor was OK and enabled me to measure the free running power drain, less than 2 amps.

From this point it was a case of working out how best to fit the drill in the space available and to transmit the drive to the axles. First, the handle was cut off the drill case and wires soldered directly onto the motor terminals. Heavy gauge automotive cable was used for all the power cabling, the thick yellow wire visible in the photos.

I decided to use ball bearings to mount the shafts for the transmission, and it proved to be a wise decision. No oil to drip or spray around inside the wagon! I also discovered that metric size bearings are a fraction of the cost of imperial ones of similar size, so there's a definite encouragement to go metric. As most BMS shafting also seems to come in metric sizes these days, there's no problem.

Photo 5 clearly shows how the drill and layshaft were mounted. The aluminium angle I already had. I bought some 32mm x 10mm aluminium bar and used bits of it bored in the lathe to take the bearings. These blocks were then bolted to the aluminium angle brackets. The brackets had slots cut for their mounting screws to enable me to line up and tension the chains, starting with the one from the layshaft to the axle, then back to the shaft held in the drill chuck, which gave me the position for the drill.

Good old 3/16W tank bolts were used to hold the bearing blocks and angles together and to the floor, which will probably horrify the purists.

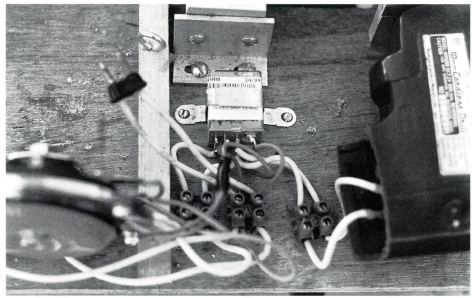


Photo 7

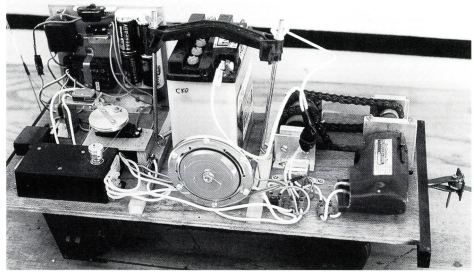


Photo 8

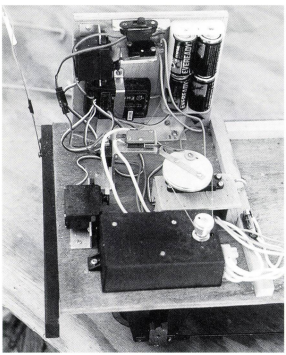


Photo 9

To mount the drill, two pieces of the 32 x 10mm aluminium were clamped edge to edge and bored out to fit the collar on the drill casing. Two pieces of 5/16W screwed rod and nuts held the whole lot together and to the floor.

Photo 6 shows the set up from the other side. I used several terminal blocks to keep the wiring tidy (sort of) and to simplify any mods that may be neccessary. The small square unit between the horn and the drill is the reversing relay, a standard 12v DPDT type from Jaycar. **Photo 7** shows this in close-up.

One of the terminal blocks has the cable and plug that fits to the 12v motorcycle battery that powers the whole rig (**photo 8**). The oversize battery clamp came about because I originally had a small car battery for the job, but the project took so long to complete (around 3 years) that it died of old age and neglect before I got to use it. The clamp and horn came from one of the cheap auto supply stores.

The control system

Photo 9 gives a pretty good view of the radio control and speed control set up. Starting from the front, the black box is a standard case and contains a 12v 10A speed control built from a Jaycar kit. The catalogue number for the kit is KC-5225 and is priced at $21.95 in my 1999 catalogue. The only mod I made was to use a wirewound pot for the speed control instead of the trimpot supplied. The wirewound pot was mounted in the top of the case and has a small aluminium pulley grub-screwed to it. This enables the large pulley, which is fixed to a standard radio control servo, to operate the speed control via the light stainless steel fishing trace used as a drive belt. The approx 3:1 gear ratio is necessary because the servo only moves through 90 degrees whereas the

pot needs 270 degrees to give full range of movement.

When I tried out the speed control it worked fine, but tended to creep at the zero speed setting. To overcome this I fitted the microswitch visible in the centre of the photo. This is operated at the stop position by the brass strip screwed to the large pully on the servo. This simply cuts off the motor power when the speed control servo is in the stop position. **Photo 10** shows this more clearly.

Reversing

To provide a foolproof reversing system I fitted the relay mentioned earlier, which is operated by the servo mounted to the left and behind the speed controller in **photo 10**. This operates when the joystick on the transmitter is moved across to the right, causing the servo to make a microswitch which in turn pulls in the relay and reverses the polarity of the power to the motor.

To avoid any possibility of going from full forward to full reverse, a sure fire way to blow a fuse or destroy the electronic speed control, a gate was fitted to the transmitter which only allows the joystick to move across to the reverse position when it is back at the stop position. This can be seen in **photo 11**. The gate was made from some 4mm plastic sheeting I acquired years ago, and stuck in place with superglue.

Receiver and batteries

All radio control units designed for model use come set up to use AA batteries, either dry cells or rechargable Nicads. I found through bitter experience during my model boating days that neither energy source is reliable enough when subjected to the level of neglect I give my models! Also the AA cells lack in duration for a whole days sailing or railmotoring.

Consequently, I have made a practice of modifying all my R/C units to use standard dry C cells, for both transmitter and receiver. The receiver batteries can be seen at right in **photo 12**, mounted on the vertical panel in a standard 4-pack holder. I have installed a twist wire retainer to keep them in after they popped out on a certain club track!

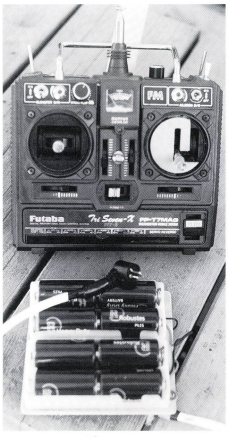


Photo 11

The receiver on/off switch sits just to the left of the batteries. The receiver itself is retained by an aluminium strip below this. To the left is a third servo which operates the horn through the microswitch just below the on/off switch. The horn is operated from the left hand joystick on the transmitter, and is great for letting people know that *Red Fred* is coming!

The aerial for the receiver consists of a length of fine electrical wire. This is attached to the piano wire mast mounted on the buffer beam at top left of **photo 9**. This now extends about 50cm upwards to give better range as described earlier. When the body is fitted the mast is retained in a wire clip using the white piece of insulation visible in **photo 12** to prevent metal to metal contact so close to the aerial.

The radio I use is a standard 6-channel Futaba set, purchased second hand from a model aircraft builder who wanted one of the latest you-beaut computerised units. A 4-channel set would have sufficed for the use I make of it at the moment, but there's no telling what gadgets I may want to operate in the future! The charging socket in the transmitter case was replaced with a polarised two-pin socket to enable the external battery pack to be plugged in. This pack consists of two 4-pack C-cell holders wired in series and screwed to a plywood plate. The whole assembly is carried in a cheap bum bag around my waist and connects to the transmitter via about half a metre of cable and the two pin plug. The battery pack and connector can be seen in **photo 11**.

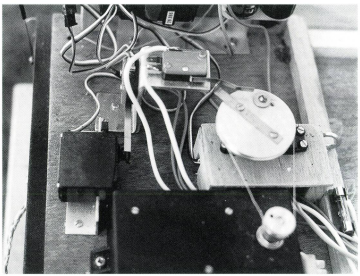


Photo 10

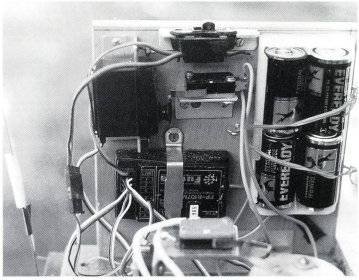


Photo 12

Conclusions

The whole *Red Fred*/A Wagon project has been a great learning exercise for me, and has introduced me to the machining side of model engineering in a relatively painless way. By using techniques from past model boats experience it made the project less daunting than a completely new project.

On top of that I made some good friends at the ARHS museum at Rosewood, and I have a, so far, unique model that turns quite a few heads when it goes toot-toot down the track. Anyone else for railmotoring by r/c?

Wheel Tread and Rail Profiles are Important!

By Dick Langford

Here is a story about what can happen when wheel tread and rail profiles don't match. In the photograph is a section of rail that has failed, with the sides of the rail head shearing under the applied load. The rail, as shown in this photo, has been cut to provide one of two slices that now serve as book-ends on my desk and regularly remind me of this event.

The rail was supporting a pair of gantry cranes, each of about 60 tonnes lifting capacity, in a copper smelter where I worked for a while about 25 years ago.

Someone at the mine decided that tapered wheel treads would provide better tracking for these cranes which were in continuous operation moving ladles of molten copper from the open hearth furnaces to converters and then from the converters to the ingot casting bays. In the converters, air is blown through the molten copper to remove impurities, particularly sulphur, which is eventually discharged to the atmosphere through a dust collector and tall stack.

The two cranes were supported by two two-wheel bogies on each side of their cross beams. All the wheels were flanged only on their inner side in exactly the same way as conventional railway wheels are. The two wheels in one bogie on each side were powered to move the cranes along the track; the wheels in the other bogies were not powered and just supported the weight of the crane. When installed, all wheels on the cranes had parallel treads and ran on conventional heavy railway rail. These rails were not inclined inward, but sat flat on the steel supporting girders, high in the smelter building. In this mode, the cranes had operated for many years without problems.

Because it was easier to remove the two unpowered wheels from each side of a crane, than it was to remove the two driven wheels, it was decided that the unpowered wheels only would be given tapered treads and the crane tracking characteristics monitored to see if this tapering improved tracking.

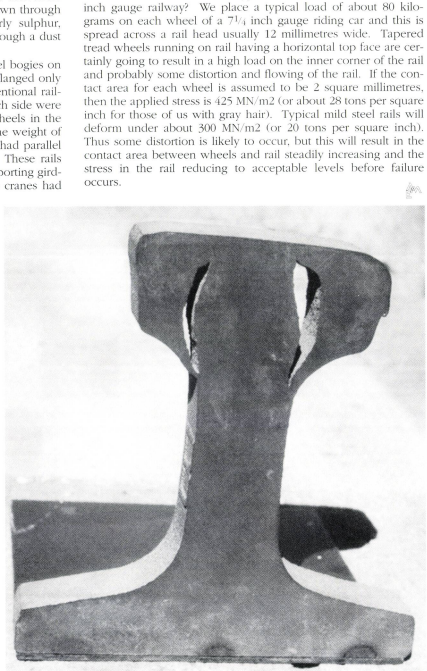
All went well for a short time, then disaster struck. Over the converters, which were on one side of the crane aisle, a section of rail collapsed, its height being reduced by about 15 mm. This section of rail was carrying the greatest load as the cranes were frequently lifting ladles of molten copper very close to this end of their cross beams and accelerating away from this area, or slowing down as they approached it.

Tapering the treads on half the wheels resulted in these wheels only contacting the inner edge of the rail. This placed an excessive load on this side of the rail head, causing it to shear away. This increased the load on the outer side of the rail head, which also quickly failed by shearing away in the same manner. In the photo, the right side of the rail section sheared first.

As a secondary metallurgist on the mine site, I had the pleasure of checking all the crane rails in situ, using ultrasonic non-destructive testing equipment to detect the extent of the damage and then determining whether or not there were material issues associated with the failure. It was certainly a hot, dirty job working on the girders that supported these crane rails whilst copper smelting continued, following replacement of just the clearly damaged rail sections. My ultra-sonic examination of the rails showed that the failure was limited to a fairly short section above the converters and was due entirely to the load increases imposed on the rail by the wheel tapering. Laboratory tests showed that the rail complied with all its specified properties.

If all the wheels on the cranes had been given tapered treads and the rails canted inward to maintain contact between the wheel tread and the rail, across the full width of the rail head, I am confident that the failures would not have occurred and better tracking may have resulted. On modern railway systems, the wheels are tapered and the steel plates that sit between the base of the rail and the sleepers provide canting to the rails.

Could we encounter this type of failure with a 5 inch or 7¼ inch gauge railway? We place a typical load of about 80 kilograms on each wheel of a 7¼ inch gauge riding car and this is spread across a rail head usually 12 millimetres wide. Tapered tread wheels running on rail having a horizontal top face are certainly going to result in a high load on the inner corner of the rail and probably some distortion and flowing of the rail. If the contact area for each wheel is assumed to be 2 square millimetres, then the applied stress is 425 MN/m2 (or about 28 tons per square inch for those of us with gray hair). Typical mild steel rails will deform under about 300 MN/m2 (or 20 tons per square inch). Thus some distortion is likely to occur, but this will result in the contact area between wheels and rail steadily increasing and the stress in the rail reducing to acceptable levels before failure occurs.



Hamilton Society of Model Engineers

Two Reports on the club's 70th Birthday Bash

Driving his Sinclair-built #66, Gavin McCabe has just pulled away from the station with another load of smiling faces. Photo: Peter Anderson

Ken McIntyre from Blenheim and his highly detailed Phantom *emerge from one of the bridges with load of happy passengers.* Photo: Peter Anderson

Quentin Breen from Train Mountain (USA) watches while his fiancée, Sharon gets a crash course in driving the Shay from Dave Giles. Photo: Roger Reynolds

— From Peter Anderson

I had planned to get up to Hamilton for their 'Birthday Bash' and registered accordingly for myself and my loco. Unfortunately, a week before, my back gave trouble so I nearly missed out. In the end I counted myself lucky to depart on the Friday morning with Gavin McCabe and Lindsay McDonnell, but without my loco. Gavin's #66 was stowed in the van and a trailer was loaded with passenger trolleys.

The Hamilton MES had gone to a lot of trouble organising the event and it all went well. There was a large number of visitors from other clubs, and a fantastic response from the public who came to see and ride the trains, and the traction engines. Monty George was there with his model Fowler in 4" scale, and there was a smaller model Burrell single. To cap it all there were two full size engines there for the 3 days. A single crank compound, Burrell #2391 (named *Norfolk Pride*), and an Aveling & Porter single #5324. These had been fitted with farm trailers and bales of straw for giving rides round the fields. It was a colour photo of one of these traction engines and Ross Hopkins, one of the owners, along with an article, in the Hamilton Press that gave their advertising such a boost, and lead to the good public turnout.

Hamilton say there were 40 loco registrations and I know mine was not there. I listed the ones I saw and I got up to 35 so it was still a good number, and when you consider the size of some of them there was plenty of power to deal with the crowds. The track stood up to the traffic pretty well but every now and again there was a flurry to deal with the cause of minor derailments.

From this end of the island Harold Sinclair took Lance's #99, Gavin had his #66 as mentioned, and Brian Wheeler had his *Bridget*. There were two from the South Island — Ken McIntyre with his *Phantom* and Don Crooks with his *Blythe Spirit* (Simplex). Murray Bold and Chris Morton from Palmerston North had Mr *Sandman* and *Robyn*, then there were those from Havelock, Rotorua, Tauranga, Auckland and Whangarei. Dave Giles had his Shay *Enterprise*, doing a lion's share of the hauling, and his *Phantom* was doing well too. Murray Lane's *Poem* had some trouble with the points.

Between playing on the trains and eating we could take a few photos, or go over and watch the stationery engines moving. The hot air engine was the largest I have seen, and was fired by a little stove affair. It pumped water around in an endless loop. A range of engines popped away while the attendant reclined in a deck chair.

At one stage there were some boats operating on what was left of the pond. This did not work though, as they were hampered by mud and some weeds on the bottom. Since Labour weekend, when there was a good level of water, the water table has dropped, and the pond has nearly disappeared. Plans are there to seal the bottom so water will be retained and the battle will just be against evaporation.

The dinner was held in the marquee on the Saturday evening and everyone had a lot of fun. Gift boxes were given away by a draw process that also lead to some laughs. Dave Simpson was an able MC drawn from the membership, and he too kept the show alive.

The highlight on Sunday evening was not necessarily the night running, which was great, but was the fireworks display. The rockets etc. had been set up in a shallow depression to the east of the track and it would have been good to have all of Hamilton there to see and hear it. I have seen some great displays set on barges in the the Wellington Harbour. This one had many of the same type of starbursts, detonations high in the air, and then the shrieking affairs — the whole variety possible. We were so close to it. It was right over head. An awe inspiring show to be sure.

The Hamilton Club are to be commended for their effort, and we thank them for the great time they provided for all their guests. No doubt they will put to good use the income generated by the weekend, by making further improvements, and extensions to their set-up.

— and from Murray Lane *(who also took the photos)*

The Hamilton Society of Model Engineers celebrated their 70th birthday over the Auckland/Waikato anniversary weekend, 27 to 29 January, 2001.

The club was formed in June 1931 and has occupied three previous sites over the years, before shifting to Minogue Park in 1986. A 3½" and 5" ground level track was built around an existing pond, adjacent to an old rubbish dump, utilising track from the old site in Hall Street, Frankton. This served for several years with various amenities being added as time passed. The attractive station was the first building erected, followed by a turntable and a small steaming bay area. A NZR two story signal box was shifted to the site later. A great pile of dirt and rubbish from building sites was dumped along side the existing track and grand plans were drawn for future track extensions, for 5 inch gauge and a new 7¼ inch track. This included interesting grades, bridges, and tunnels, with a final length of 1.6 km. Over the past 15 years this plan was gradually turned into reality. New steaming bays, two turntables and a storage shed have also been added, and with a monetary grant, the station area has been paved and a roof built over the top.

The weather for the weekend was excellent and there were several visitors from overseas, including Quentin Breen and his fiancée, from

A Harold Sinclair built 2-4-0+0-4-2 Mallet engine from Wellington.

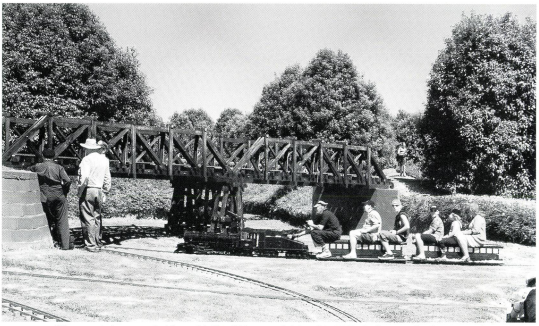
A view of some of the stationary engines on display.

Monty George from New Plymouth driving his 4" Fowler, with a load children and parents on a two row seat cart.

These are agriculture traction engines and as such have no springs and are rather rough riding. They are owned by a Hamilton based syndicate. On the left is a single crank, 2 speed, Burrell of 6 NHP Norfolk Pride. *(no.2391 built in 1901). It was last used for commercial work, threshing grain in 1964. On the right, a 1903 Aveling & Porter no. 5324 of 8 NHP. The* Duchess of Kent *is a single, 2 speed engine from the South Island.*

Train Mountain in the USA, one from Canada, and two from the South Island. On the Saturday a busload of 45 members of the Auckland Railway Enthusiasts Society attended. There were over 300 registered for the event with 38 locomotives. The New Zealand record for the number of passenger rides was broken on the Sunday, with 4,200 rides. The total for the weekend was 10,800, which included 1,800 by the two full sized traction engines and Monty George's 4" Fowler. There was also a working display of various old stationary farm engines and two post war single cylinder tractors.

A dinner for 100 was held in a Marquee on Saturday night, at which the mayor of Hamilton, Russ Rimmington presented a trophy from the City Council commemorating the 70th birthday of the club. Hamilton members, Brian Clark, Geoph Howarth, and Gregor McNeil were made life members of the club, during the evening. A barbecue was held on the Sunday night. A portable shower and toilet were provided for the visitors, who found the amenities very welcome after a day's driving. Apart from a couple of minor problems, this mini-convention was extremely well planned and executed. Full marks must go to Valerie Clark and her team of workers, who provided all the meals except the Saturday night dinner.



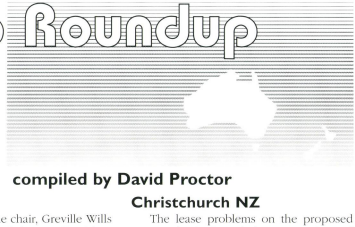
Warren girder truss bridge with Paul Newton driving his NZR C class in the foreground

Steaming bays with the old refurbished turntable, new air operated turntable to the rear. In the background is the new storage area to the rear of the station.

Station with Gavin McCabe's 2-6-2 being driven by Ian McKay, just leaving. Note the signal box behind the loading area.

Ken McIntre from Blenheim driving his very detailed Phantom *out of the station. The motion work is fitted with needle rollers.*

Club Roundup



compiled by David Proctor

Auckland NZ

After 3 years in the chair, Greville Wills is enjoying a break and the new President is Alan Emerson. Recently on display was one of two motor/gearbox units for the new club locomotive. Each motor unit is of 1HP rating and through the gearbox will drive 6 wheels, 2 directly fitted to the output shaft and the others chain driven from the output shaft. The wheels are CNC machined from EN8 steel. The loco will be a joint project by the members.

Auckland Society of Model Engineers
Location: *Petersen Road Reserve, Waipuna Road, Panmure*
Public Running: *Every Sunday*
www.asme.org.nz

Balcatta WA

A couple of issues ago it was mentioned that Steve Reeves and Phil Gibbons were building a *Bloufly* as a club loco. The basis for the loco is the *Bloufly* chassis by James Giddons, referred to in *Model Engineering — The Next Generation* in the last issue of AME. Job commitments plus the discovery of girls meant that James did not progress much further with his chassis. The loco had its first road test on New Year's Day at the track and pulled 2 loaded wagons for most of the day. There is still some plate work to finish..

The concrete pad and footing are down for the long-awaited club house and workshop and now the big task is to get the whole thing finished within the next 24 months, the time limit set by the council.

Northern Districts Model Eng. Society
Location: *Vasto Place, Balcatta*
Public Running: *Last Sunday*
http://www4.tpg.com.au/users/jimclark

Burnaby, BC Canada

The Santa Express at Lougheed Mall is done for another year. There was a 4% increase in donations over the previous year with only three additional late night shifts. Some members saw the New Year in at the track with trains ready to roll on the stroke of midnight. The following Sunday saw the first meet of the new millennium, the Frostbite Meet.

British Columbia Soc. of Model Engrs
Location: *Rainbow Creek Station, 120 Nth Willingdon Ave, Burnaby, BC.*
Public Running: *Saturday, Sunday & public holidays, Easter to Thanksgiving*

Christchurch NZ

The lease problems on the proposed new track site have led to suggestions of an alternative site near the showgrounds. A decision will be made after the appropriate investigations and deliberations. In the meantime, a half scale set of flexi points has been made for demonstration and appraisal. With donations of the turntable and seven tons of track steel, a start will be made soon on prefabricating standard sections of rail and points ready for the chosen new site.

On the boating side, Ewan Allison has relaunched his 5 ft tug, powered by two electric motors and future plans include water pumps for his fire monitors and improved volume on the diesel sound generator. A suggestion for building a scale working container crane as a club project has received a lot of interest.

Other news is that the club is now on the internet — see below for their URL.

Canterbury Soc of Model & Exp. Engrs
Location: *26 Andrews Cres, Christchurch*
Public Running: *1st & 3rd Sundays*
http://www.rcmodels.com/clubs/csmee/index.html

Cobden Vic

The big effort by the members is to get the place ready for the AALS Convention, which has come at very short notice. Some of the work done since the last convention includes a roof over the three track platform, a huge Refreshment Rooms, souvenir kiosk and Mini Golf course. The locomotive and carriage depot has been expanded and members are well on the way to completing the Curdies River Trestle Bridge Loop, which will provide a different 900 feet long extension with a proper wooden trestle bridge passing over the northern dam which has also been enlarged.

A couple of members attended the Warnambool Model Exhibition with two trains in tow and attracted much attention for their efforts. There was more emphasis on modelling and less on the commercial aspect this year which made it a much more enjoyable event.

South Western Model Engineers Inc
Location: *Grayland St, Cobden*
Public Running: *3rd Sunday*
www.gatewaybbs.com.au

Durban RSA

Members have been getting ready for the DSME exhibition to be held from 30 March to 1 April. The first meeting of the year saw a very interesting talk by one of the members, Arthur Pienaar, on his hobby of building and flying model helicopters. The talk was very detailed and informative. That Arthur really knows his stuff is demonstrated by the fact that he has built 7 models of the Oryx helicopter as drones for the military, where they are used for target practice.

Durban Society of Model Engineers
Location: *Kellaway Hall, 10 Hinton Grove, Virginia*
Public Running: *2nd Sunday*

Eltham Vic

The continually high temperatures have made life difficult for train crews on running days, as well as taking a toll on the rolling stock and signal system, but on a more positive note, the first shipment of 6 kg JIS rail for future mainline projects has been received. This means that in future, trains will run on smooth, properly profiled track, improving passenger comfort and reducing wear and tear on rolling stock and locomotives. The new platform road at Meadmore Junction is now complete as is the "Gnome's Home" siding.

This year the Inter-club 7¼" gauge Corroboree Weekend will be on 27 and 28 October, tying in with the DVR 40th Anniversary on October 29.

Diamond Valley Railway Inc
Location: *Eltham Lower Park, Main Road, Eltham*
Public Running: *Every Sunday & pub. hol*
http://www.railpage.org.au/dvr

Euroa Vic

Ted Murrell has built a new petrol club engine for the use of members who have yet to build their own loco's, and to operate on the club's portable track.

Like most Clubs, the group who do the track maintenance have been hard at it. A new set of points has been installed between the new extension to give a smoother ride. The Club has decided to hold an "Annual Invitation Days" as part of the Wool Week Festival so there are activities that the visitors and family members may find more to their interest. See *Coming Events* for details.

Euroa Miniature Railway.
Location; *off Turnbull St, via Hunter St. Euroa.*
Public Running: *4th Sunday*

Galston NSW

Over the last three months a lot of work has been carried out at the track, despite the hot weather. The work on the new sidings between Hill Top and Martin's Place is continuing and new points have been cut into the main line below Hill Top for the new relief line that will rejoin the main in two places before it reaches

Martin's Place. Another three sidings will branch from this relief line. The main line has been lifted and re-ballasted in a number of places with mesh and a membrane barrier to control the movement of dust and mud up through the ballast. 3 point motors at the north end of the station have been replaced and the control panel on the loco unloader has been re-wired and upgraded. More grass turf has been laid in the picnic area, paving blocks under the picnic tables and a bench seat in the new Wattle Siding. Council approval has been received for the new workshop.

Hornsby Model Engineers Co-op Ltd
Location: *29 Mid Dural Road, Galston*
Public Running: *2nd Sunday*
http://www.sdr.com.au/hmecl/index.html

Gosford NSW

One member has built a wheelchair trolley, a 7¼" well wagon which can carry a full-sized motorised wheelchair as well as a minder at the same time. At its trial it was declared to be a success.

The February run day was a very successful start to a new year with in excess of 1200 rides taken and apparently tons of onions peeled!

Central Coast Steam Model Co-op Ltd
Location: *Lot 10 Showground Rd, Narara*
Public Running: *1st Saturday*

Horsham Vic

Enthusiasm, good local council support and more than a little hard work from our 12 member club has seen the completion of stage one of the new track development at the Sawyer Park site. Presently we have 350 metres of dual 5/7¼" track, steaming bay unloading area with traverser and a storage shed. All of our track is on slotted plastic sleepers; so far (1 winter, 2 summers) it is working nicely with minimum maintenance.

Most of the material for stage 2, a further 250 metres is on hand waiting for foundations to be finished. Our best day during stage one saw just over 100 metres of track of track laid, so we hope it won't take too long. The area has a good potential, including great areas for traction engines and we will certainly find plenty to do for many years yet.

Wimmera Live Steam & Model Eng. Soc.
Location: *cnr Hocking & Firebrace Streets, Horsham*
Public Running: *2nd Sun. (not summer)*

What has your club been up to?

We all like to keep in touch!

Send a brief note to tell us!

Or post a copy of your **newsletter** — but make sure you use a highlighter pen to show any item you would like us to publicize. Remember to concentrate on news that appeals to AME's wide range of readers.

Maidstone NZ

Both the elevated and ground level tracks have been professionally surveyed and the result will be a comprehensive track plan with levels and gradients.

A planned project is the provision of a secure storage place with a fairly large addition to the station building. This area will be used mainly for passenger trolleys and rolling stock.

Several consecutive fine Saturday mornings has seen good progress in welding up and laying the 7¼" ground level track on the concrete bed laid last year. There is only a couple of hundred metres to go now and then the placing of intermediate sleepers.

Maidstone Model Engineering Soc. Inc
Location: *Maidstone Park, Upper Hutt*
Public Running: *Every Sun. pm Oct-April*

Mangere NZ

The Waitangi Day run for the disabled was well supported by the public, the members and the specially invited people with disabilities. Around 1100 passengers were carried with 600 free rides for the disabled and their carers. The seven trains running just coped with the traffic. The changes to the main yard carried out last year proved a great success, allowing longer trains and no delays with loading and unloading.

Manukau Live Steamers Inc
Location: *Mangere Centre Park, Robertson Road, Mangere*
Public Running: *Every Sunday*
http://sites.netscape.net/manukaulivesteam

Millswood SA

Ever since its original construction the 7¼" turntable has only lined up with the on and off track in one position and consequently colour coded on the correct end. Recently the complete track was removed from the turntable frame and repositioned so that it now lines up regardless of which position it is in. The run off track now has a strong set of spring buffers and a red light for night time running. A further modification in this area is the renewal of track and supports in no.1 bay, next to the tennis courts. This will now support heavier locos and will be on a curved track in conjunction with the loco lifter. Any locomotive which can adequately negotiate the curve onto the turntable will be able to travel over all trackage, including switches (turnouts).

The annual "Show of Work" night saw many interesting and some unusual items on display. John Levers is restoring a 14' 6" clinker built launch (dug from the Murray mud), with a Yarrow type boiler and single cylinder vertical engine to come. Some of the models on display were a cabin cruiser, two part built 7¼" *Wrens*, a 4-cyl. Oscillating engine, a 10cc tethered hydroplane, a horizontal gas-fired boiler, 7¼" gauge "D" 4-truck Shay and a blower. Equipment on show included a Blanchard style copy lathe, a bench type toggle press and a fully adjustable spherical turning attachment.

South Australian Soc of Model & Exp. Engineers
Location: *off Millswood Cres, Millswood*
Public Running: *1st Sun. & 3rd Saturday*

Moorabbin Vic

On the Gauge 1 track the removable section has been made permanent due to ground shift and temperature variations. Another passing loop has been installed at the other side of the oval. A tunnel is under construction and Keith Hartley is working on more of his scale lineside features. A trial section of track has been ballasted and two more sets of points have been constructed. Two sets of steps have been made to allow access to the middle area of the track and the circles and the few shrubs which have been planted have taken hold. A donation of brick pavers will go towards having a nice dry path to walk on.

Dave Smith has converted a 5" GWR light Prairie 45xx 2-6-2T class to a heavy minerals 42XX class 2-8-0T loco. Having acquired a *Firefly* chassis which ran on air, albeit very stiffly, he let his penchant for 8-coupled engines take over. After a lot of work and modifications the result is a very nice looking and useful locomotive.

Steam Locomotive Society of Victoria
Location: *128 Rowans Road, Moorabbin*
Public Running: *1st Sunday*

Morphett Vale SA

High temperatures have been causing problems at several tracks around the country over the summer months, and the MVR has been no exception. Fortunately the number of buckles and bumps is declining each year thanks to the continuing programme of inserting heavy plastic sleepers in the track.

The new track extension work has begun in the station and will eventually offer some variety to operations, although in the mean time it is by no means a small job!

The arrival of more gondola style wagons has lept the Rollingstock Department busy. They look great in the club colours *(how about a coloured pboto or two? ... Ed)* and ride the track extremely well.

Morphett Vale Railway Inc
Location: *Wilfred Taylor Reserve, Wheatsheaf Road, Morphett Vale*
Public Running: *2nd & 4th Sunday*

New Plymouth NZ

The NPSMEE have a new club locomotive. It takes the form of a 7¼" gauge model of an NZGR Ec class electric locomotive and was built by Dave Giles in 1991 (and featured in *AME* issue 40). Dave has regauged it to 5" because as one New Plymouth member said "Lets face it, the novelty of running around the track holding up one side would have worn off

very quickly!" The locomotive was rebuilt in 1997 when two new 600 watt motors and an EDM controller were fitted. It is powered by 4 x 6volt deep cycle batteries.

New Plymouth Soc. of Model Engineers
Location: *cnr Liardet and Gilbert Sts, New Plymouth*
Public Running: *Every Sunday*

Perth WA

The permit for the replacement bridge has been issued by the Council at last and the final section of the bridge has been delivered. By the time you read this the replacement piers will be done and work well under way. Some members have continued with the track levelling and raising Canning section and up to the 5" shed. Shouldn't be too long before some rodding and new signals appear.

Castledare Miniature Railways of WA Inc
Location: *Castledare Place, Wilson*
Public Running: *1st Sunday*

Vancouver Island BC

The club has decided to purchase plastic ties (*sleepers to those of us who know better!*), which are a nominal size of 2" x 2" (closer to 1.5" x 1.5") in 8 feet lengths. Each length will give 6 ties at 16" each and the 8' lengths come in bundles of 100. The purchase of four bundles will provide sufficient ties for about 1000 feet of track. A preliminary design for the track, which will include some interesting features, has been prepared and now requires approval from SHAS, the museum which owns the land on which the track is located.

Vancouver Island Model Engineers
Location: *7321 Lochside Drive, Saanichton, BC, Canada*
Club Run: *2nd Sunday*
http://www.pacificcoast.net/~trainman

Warner Qld

As an engineering society the membership spans many interests apart from model railways. In November the members and families booked out the steam Tug *Forceful*, a major drawcard for the Brisbane Maritime Museum at Southbank near the city. The afternoon included a pleasant cruise to the mouth of the Brisbane River and a BBQ tea. And of course we all could not resist the opportunity to visit, first hand, the engine room and boiler house. Certainly made you realise just how difficult it must have been for the original crew working these areas especially as this tug was ocean going and featured in some major towing rescues in adverse weathers.

Our AGM has just been completed with the following elected to office. President Don Bell, Vice President Tom Hulse, Secretary Hugh Elsol, Treasurer John Andrews, Committee Harry Beauchamp, Max Faulkner, Rhys Jones, Pat Weaver and Colin Whatley.

As mentioned last time many projects have started throughout the site and all are progressing ahead of schedule. Come visit us if you are in our area, we would love to see you and swap tales of our hobby.

To visit Contact Secretary, PO Box 322 Everton Park 4053

Qld Society of Model & Exp. Engrs Inc
Location: *Lot 5, Warner Road, Warner*
Running Day: *2nd Sunday except December, by invitation (no public).*
http://www.steammachine.com/qsmee/

West Ryde NSW

David Lee had his new battery powered loco at the November running day. It is modelled on a Ruston Hornby diesel shunter which worked as a workshop shunter in Port Augusta and is powered by a XD Falcon fan motor with a 9:1 reduction driving a jack shaft. It weighs about 90 lb and is 2 feet long and happily pulls the driver around drawing 10 amps up the grade. Also, new at the track — Warwick Allison has brightened up his consist with a bright red WAGR hydrochloric acid wagon and the Tullochs had the 2-2-2-0 *Teutonic* built by Jim Ranford running after having done some work on it.

The retaining wall and ballast siding are progressing nicely. Steel work for the track has been manufactured and galvanised, the end of the wall formed and concrete poured to provide a proper finish at the end and it has been planted with native vegetation. The elevated carriage shed traverser is now in place on the rails and is of 'elegant' design.

Sydney Live Steam Locomotive Society
Location: *Anthony Road, West Ryde*
Public Running: *3rd Saturday (pm)*
http://www.pnc.com.au/~wallison/slsls.htm

Whangarei NZ

Work is still progressing at a good rate on the new track at Maunu and at present the big task under way is the construction of a 25 metre tunnel. A lot of earth has has been moved and during the digging process a 20 ton digger had to be called in to move some rocks!. The footings and floor have now been poured ready for the block walls to be built over the next few weeks. As the photographs show, the trackwork is also getting longer and more interesting.

Whangarei Model Engineering Club
Location: *Heritage Park, Hwy 14, Maunu*
Public Running: *None yet*

Farewell

We say goodbye and thankyou to these model engineers who have passed on:

Bill Bonser (Hornsby ME)
Harry Clarkson (Canterbury SMEE)
Ross Goldspink (Bracken Ridge CR)
William Morrish (SLSV Moorabbin)
Arthur Priest (Hamilton ME)
Frank Ryan (Castledare MR)
Victor Thrum (SASMEE Millswood))

and extend our condolences and best wishes to the family and friends they leave behind.

Earthworks for the new Whangarei tunnel Photo: Roger Reynolds

Tui Frew, visiting from Thames, shows that the ladies can have just as much fun as 'the boys' at Whangarei. Photo: Roger Reynolds

These 4 locos are all built to the Phantom *design and are seen at the new crossover on the Whangarei track* Photos: Roger Reynolds

Wollongong NSW

Work has continued at a slower pace on the completion of the new club house even though it went up in double quick time. Those finishing off jobs are what take the time.

Some new 'horses' have been seen at the track recently. Kevin Smith brought along a shiny new black *Blouefly*, while Jack Keller has given his brand new *Simplex* a trial run. Kevin's *Blouefly* brings the number of "Blowies" in the club up to eleven, while new member, John Seckold also has one on the go. Everyone is waiting to see Robert Woolley's 'Blowfly Garratt' emerge sometime this year (not that anyone wants him to feel pressured!).

To help the general public to identify ILS members in the crowd on public running days, a set of vests are being made up for station staff and guards to wear while on duty. They will be yellow with green trimming, bearing the club badge and the letters 'ILS'.

Illawarra Live Steamers Co-op Ltd
Location: *Stuart Park, Virginia St, North Wollongong*
Public Running: *4th Sunday*

Coming Events

12 May

25th Anniversary — Prospect SA

Come and help the Adelaide Miniature Steam Railway Soc. members celebrate their 25th Anniversary at Railway Park, 370 Regency Road, Prospect with a run and a BBQ. All welcome. Contact Peter Hoye (08) 8344 3507

19 to 20 May

NSW Interclub Run — Bathurst NSW

Bathurst Miniature Railway Soc. have a ground level 3½"/5" track with a main line of 550m. Modified forklift unloader to elevated turntable. Elevated and ground level steaming bays with water, 240v power and comp. Air. Char will be provided. Contact Garry Sewell (Secretary) on (02) 6331 6886 or e-mail gsewell@ix.net.au

19 to 20 May

Kindred Society Run — Moorabbin Vic

Once again the members of SLSV invite you to join them for a weekend of fun at Rowans Road, Moorabbin. This year's theme is *Small Gauge Revival.* The 3½" elevated track is considered on of the best in Australia so dust off that loco and give it a run. Also 2½" and O gauge plus the new gauge 1 track is operational. 5" gauge also welcome. Wear your club ID and bring your boiler certificate. Morning and afternoon tea and BBQ lunch each day (advise if lunch reqd). Contact Ken Rofe (03) 9580 1408 or Graham Plaskett (03) 9750 5022

19 to 20 May

Open Weekend — Thames NZ

The Thames Small Gauge Railway are hosting another great weekend of smoke, steam, fun and fellowship with other railway modelers. Public running from 10am - 4pm each day. 5" and 7¼" dual gauge track. 900 metres of pure delight along the Thames foreshore. Contact Ph/fax (07) 868 6678 email: sgiames@voyager.co.nz

9 to 10 June

Steam, Horse & Vintage Rally — Echuca

The Campaspe Valley Railway together with the Rotary Club of Echuca invite you to their big annual event. 5" and 7¼" tracks. A major Victorian steam rally with a large collection of steam rollers traction engines, etc. Book accommodation early. On site camping but no washing or power. Contact Ross Walker 0418 319780 or (03) 5480 7206

24 June

BrackenRidge Central Birthday — Qld

Prizes for best QR loco and Best loco overall. Lunches and drinks provided for drivers and crew, char provided for locos (if you use coal it's BYO). Contact Neil Mackenzie on (07) 3261 2042

7 to 8 July

Bendigo Engineering Exhibition — Kangaroo Flat Vic

The Bendigo Society of Model Engineers invites you to attend the Bendigo Model Engineering Exhibition. It will feature numerous displays, working models, demonstrations and a range of stalls selling modelling tools, books and engines. Prizes will be awarded in several categories. The venue is the Kangaroo Flat Leisure Centre, Browning Street, Kangaroo Flat Vic 3555. Admission adults $5.00, children $2.00 and families $12.00. For further info. and entry forms please contact Allison Castles (03) 5444 5799 email: hvp@origin.net.au or Ray Hayward on (03) 5442 4500

7 to 8 July

Timbertown Rally — Wauchope NSW

The Timbertown Steam & Oil Engine Club are hosting this rally and invite you to come along. Vintage and heritage machinery, tractors, 5"/7¼" ground level railway (under construction — watch this space), stationery engines. Contact Ian Strawbridge (President) (02) 6587 4455 e-mail info@webmaker.com.au or Bob Radnidge (Secretary) (02) 9918 6430

4 to 5 August

20th Birthday Run — Narara NSW

Members of the Central Coast Steam Model Co-op invite you to help them celebrate their 20th Birthday. Saturday is normal public running from 11:00 to 16:00 (visitors need not haul passengers), then private till 20:00. Sunday is private all day from 11:00, 5"/7¼" ground level. Raised steaming bays. Don't forget boiler certificates. Char and coal supplied, 240V, 12V, compressed air, overnight security if required, toilets, camping, refreshments. Please advise if attending for catering purposes. All welcome. Contact Sec. Edith Bearman (02) 4388 2416

15 September

All Comers' Day — Box Hill Vic

Once again everyone is invited to come and sample some good old fashioned Box Hill hospitality. BBQ lunch and afternoon tea provided. Boiler certs a must. Contact (03) 9898 2671

29 September to 1 October

Annual Steam Up — Port Augusta SA

Port Augusta Model Engineers invite all train buffs to this annual event at Homestead Park, Elsie Street, Port Augusta. 5" ground level track with minimum 40ft radius. Come and enjoy a weekend of running and conversation. Further details from G Eberhard (Sec.), 5 Higginson St, Port Augusta 5700 (08) 8642 4246 or Ernie Riding (President) (08) 8642 3858 or email: eariding@augusta.gulf.net.au

12 to 14 October

Annual Birthday Run & AALS Interclub Run — Galston NSW

This year the Hornsby Model Engineers are combining their Birthday Run with the Interclub Run over 3 days (Sunday will be open to the public).

13 to 14 October

13th Australian Miniature Traction Engine & Steam Road Vehicle Rally — Mannum SA

This year, for the first time, the rally is being held in South Australia at Mannum, on the Murray, 100k east of Adelaide. Mannum has a long association with steam, the birthplace of the Murray paddle steamers, the Shearer steam car and permanent home of the restored PS *Marion*. The rally is already being strongly supported by the Mid Murray Council who will underwrite our insurance and open the Showgrounds where the Mannum Football Club have their oval and club house, our focus. There will be a Main Street parade from the showgrounds to the town centre and return from 11:00 am on Saturday. Registration forms now available. For more details, contact John Levers (08) 8569 2842 *(Also see page 53)*

2 to 4 November

Invitation Run — Wagga Wagga NSW

Contact David Font (Secretary) on (02) 6921 4762 or e-mail dfont@tpg.com.au

3 to 4 November

Annual Invitation Days — Euroa Vic

Euroa Miniature Railway is hosting an Invitation Model Engineering Weekend, with Club and night running on the 3rd and a public running on the 4th of November, as our contribution to the "Euroa Wool Week Festival". Traction Engines, Models, Model Engines and Boats are all welcome. Your Club is welcome to put a float in the Wool Week Parade on Saturday, to publicise your activities. Contact Sec. James Carter on (03) 57951011 or 0428 554 106 or PO Box 206, Euroa. Vic 3666

10 to 14 January, 2002

Modex 2002 — Palmerston North, NZ

The Palmerston North Model Engineering Club is hosting MODEX 2002, the NZ International Convention and Exhibition. More details on this exciting event will be published in later issues. Contact address is MODEX 2002 Registrations, 12a Hereford St, Palmerston North, New Zealand. Ph. 64-6-355-7000, Fax 64-6-355-7008 or email pnmec@clear.net.nz

Garratt Gossip

with John Cummings

First, I must draw the attention of our readers to the Plough Book Sales page. For some time now I have noticed that they have been advertising the book *Beyer Peacock Locomotive Builders to the World*, but I keep forgetting to mention it. Yes, it is expensive but I can highly recommend this book. You might ask why. For me, an ex NSWGR apprentice, I could see where the design for the Eveleigh Railway Workshops came from or was influenced by, besides, I recognized a lot of machin-

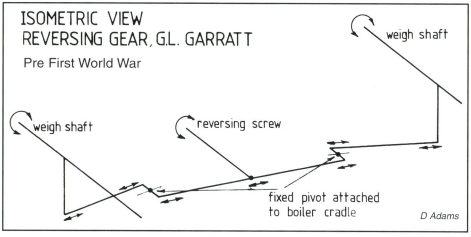


Figure 1

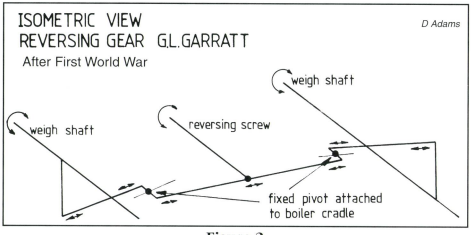
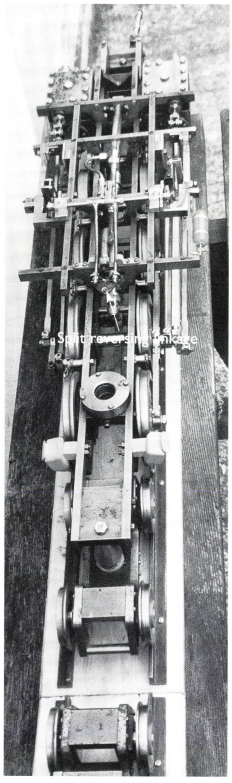
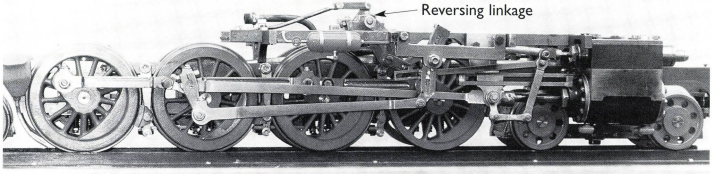


Figure 2





ery that was Beyer Peacock designed. Apart from this there are a lot of good photos of Garratts and conventional locos.

In the last *Garratt Gossip* (issue 94) I mentioned that Peter Wardle gave me some photos of his *Narok* where you can clearly see how the reversing gear is located. Well, here are the photos that I forgot. Even our editor slipped up on my failure to put in the photos. *(He's a dopey sod!)*

Since the last *Garratt Gossip* I have received a phone call from Peter Wardle to point out to me that the reversing gear diagram that was published in issue 94 was the pre World War One design. This diagram would position the die blocks in the UP position on one engine and in the down position on the other engine. After WW1 the following diagram for the reversing gear was adopted and this put the die blocks in the same position, DOWN when running forward (chimney first) and UP when running in reverse. See **Figures 1 and 2**.

As a matter of interest, in the book *The Origins of the Garratt Locomotive*, it is mentioned that "The First World War (1914-18) stopped further development on the Garratt and in particular on three designs for the South African Railways." Further on in the same chapter it is mentioned that no locomotives could be built during WW1. In November last year I received from our Editor, some back issues of a South African publication *SA Rail*. Well, I found some interesting articles about Garratts and in one issue (No.5, Vol 31) one item in particular caught my eye. I assume that you know about the South

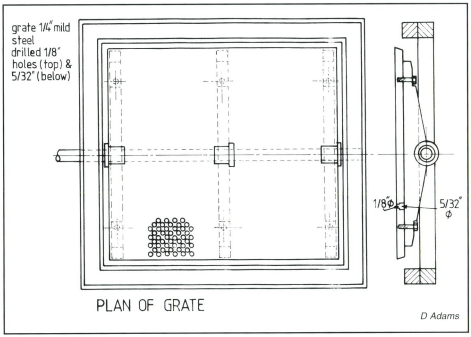


Figure 3

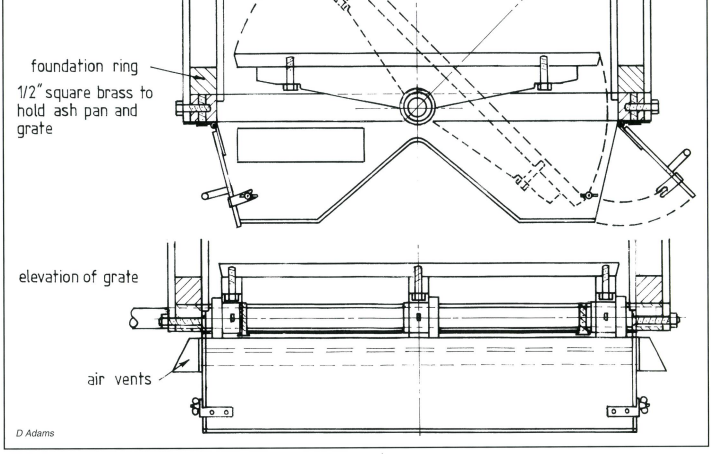
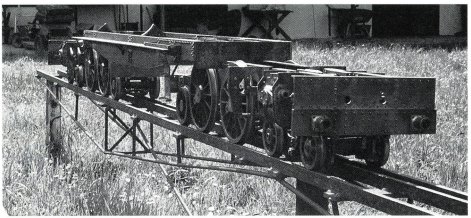
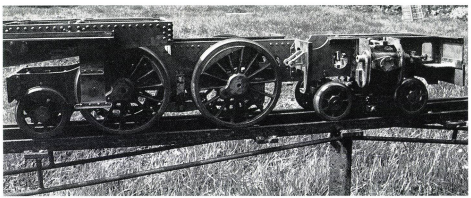


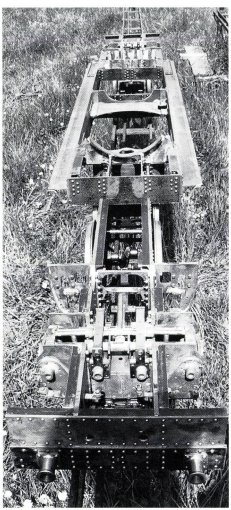
Figure 4



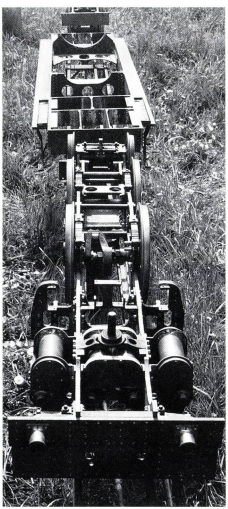
The rolling chassis of Graeme's 'M' class Garratt



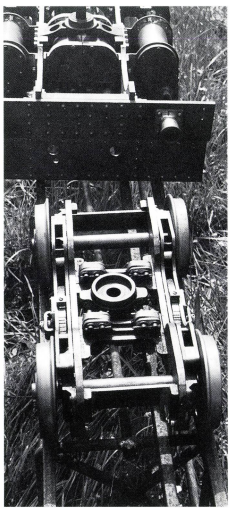
The rear engine on the 5" gauge 'M' class



The 'M' class is a little over 9 feet long



The underneath of the rear engine



One of the 'M' class swing link bogies

African loco *RED DEVIL*, but did you know about the *RED DRAGON*? I must confess that I didn't until I read this particular article. The *RED DRAGON* was a 2ft gauge (610mm) NGG16 Garratt (No. 141) owned by Alfred County Railway (SA). The article mentions the various modifications carried out on two particular Garratts, nos 141 and 155, both NGG16 class but only one was painted red. The piece that got my attention was about the fire grate. It's called the Pin Hole Grate, which, going by the description in this article, is the same grate that Keith Bradford has installed in his 5" gauge Fyansford Cement Co Garratt. See **Figures 3 and 4** and see *AME* issue 88, page 32 for a drawing showing size, spacing and layout of the holes.

Late November last year I visited the Galston Valley Railway on their work day where I met up with Eric Warburton, who asked did I know of anyone who was interested in drawings of the NSWGR AD60. He said that it was not a complete set but he felt that it was enough to build from. Should anyone be interested they can contact Eric at home on (02)9987 4266.

I have also received some photos and a letter from Graeme Loan in Tasmania who is building an M class Garratt in 5" gauge which has a wheel arrangement of 4-4-2+2-4-4 and eight cylinders. So far Graeme has prefabricated everything

Construction List of Australasian Garratts

Australian Standard Garratt: CLTB G class (1067mm gauge)				
G1-G65 (CLTB 1-CLTB 65)	Various builders	57		4-8-2+2-8-4
New South Wales (Government): AD60 class 1(435mm gauge)				
6001-6025	BP c/ns 7473-7497	1952	25	4-8-4+4-8-4
6026-6042	BP c/ns 7528-7544	1952	17	4-8-4+4-8-4
6043-6047	BP c/ns 7545-7549 spares		1	+ 2nd 6042
New Zealand (Government): G class (1067mm gauge)				
G98-G100 (6 cylinders)	BP c/ns 6484-6486	1928	3	4-6-2+2-6-4
Queensland (Government): Beyer Garratt class (1067mm gauge)				
1001-1010	BP c/ns 7341-7350	1951	10	4-8-2+2-8-4
1090-1109	FB c/ns 2905-2924	1951		
	BP c/ns 7433-7452	1951	20	4-8-2+2-8-4
South Australia (Government): 400 class (1067mm gauge)				
400-409	FB c/ns 2973-2982	1953		
	BP c/ns 7622-7631	1953	10	4-8-2+2-8-4
Tasmania (Emu Bay Railway): (1067mm gauge)				
12-14	BP c/ns 6580-6583	1929	3	4-8-2+2-8-4
Tasmania (Government): L class and M class (1067mm gauge)				
L1-L2	BP c/ns 5525-5526	1912	2	2-6-2+2-6-2
M1-M2 (8 cylinders)	BP c/ns 5523-5524	1912	2	4-4-2+2-4-4
Tasmania (North East Dundas Tramway): K class (610mm gauge)				
K1-K2 (compounds)	BP c/ns 5292-5293	1909	2	0-4-0+0-4-0
Victoria (Government): G class (762mm gauge)				
G41-G42	BP c/ns 6267-6268	1926	2	2-6-0+0-6-2
Victoria (Australian Portland Cement): (1067mm gauge)				
No 1	BP c/n 6794	1936	1	2-6-0+-0-6-2
No 2	BP c/n 6935	1939	1	2-6-0+0-6-2
Western Australia (Government): M, Ms, Msa classes (1067mm gauge)				
M388-M393	BP c/ns 5477-5482	1911	6	2-6-0+0-6-2
Ms424-Ms430	BP c/ns 5665-5571	1912	7	2-6-0+0-6-2
Msa466-Msa475	Midland c/ns 46-55	1930	10	2-6-0+0-6-2

Notes on Garratt List

CLTB = Commonwealth Land Transport Board
BP = Beyer Peacock
FB = Franco-Belge
Midland = Midland Railway of WA

List only includes Garratts which saw revenue service in Australasia and does not include Garratts imported from South Africa into either Australia or New Zealand for preservation.

except the wheels. The valves are inside admission piston and double ported. He proposes an 8" dia boiler to supply the needs of the 8 cylinders.

Recently I was given a copy of an extract from *The Railway Gazette*, March 1936, about the Algerian Railway standard gauge Garratt. This extract has outline drawings of front and rear end, side views, all with dimensions, also photos of front end, both sides of the complete loco cab interior and close up of the rear engine showing details of the Cossart valve gear. Should any modeler be interested be interested in a copy of this extract feel free to contact me. The cost would be $6 including postage and packing.

At the Blue Mountains Railway Society public running day last November one of our members mentioned that he did not realize that there had been so many different types of Garratts in Australia. He only knew of the AD60 and ASG. This gave me the idea of writing up a list of Garratts that have run on Australasian rails, then I received a letter from James Tennant with a list like I was proposing to do. Thankyou James, you saved me some work. That's all for now ... until next time.

You can email John Cummings on: jandpcum@pnc.com.au

We are looking for good photos, preferably colour, of model Garratts for an upcoming feature.

Do we have one of your Garratt?

Care of Model Boilers — To Store Wet or Dry?

by David Evans

This is a discussion about one of those topics that periodically crop up around steaming bays or at lunch breaks. It is one of those old chestnuts that can make both amusing and sometimes very valid points about the care of boilers of locomotives and traction engines. It largely depends of course, on who makes up the group. However, in recent times I have had reason to look at this matter a lot closer than has been done in the past and I have had cause from what I have seen, to re-inforce my past beliefs on the best, or perhaps safest way to keep a boiler in top condition when not in use or, as some would say, it's "down time".

For fellow model engineers who care about their boilers, this can become a serious and sometimes quite a vexatious matter. One often hears the old saying "my boiler is copper, won't corrode like steel." That's reasonable, but not as safe as one may think. These days there are a few more points to consider, not the least of which is the water itself. During the last year or so I have had the opportunity to look inside a number of boilers of varying size. As I was the builder of some of these it has been interesting to look at their interiors to see how they are shaping up to wear and tear from past use. Most were in quite good condition, but one or two were not standing up as well as one would expect. The age of these units was from 3 to about 18 years of age. Not old for a copper or steel boiler. So the question must be asked, "what is going wrong?" There is no simple answer here. The owners cannot be blamed as though they were non-caring, for they were not. It does, however, support a series of opinions that I have held for a long time. I am not a follower of the discipline of wet storage for model boilers. To me, I cannot think of any valid reason to do so. As we progress with this paper, I shall give my answers to the problems we will be looking at and to try to make the answers simple and straight forward.

Blowing Down

Most people, i.e. locomotive and traction engine drivers, agree that it is the long held practise to blow down boilers after the day's run. The procedure is that, when the steam pressure has dropped to a low

pressure, the drain cocks are opened to allow steam and water to discharge and empty the boiler of its contents, including any sediment if present. The boiler has by now lost most of its heat and no serious harm can be done because the temperature is now fairly uniform throughout. This is the safest way to keep a boiler in good condition, be it copper or steel.

In the past, some have disagreed with this and left the engine to cool down retaining its water. It has also been a practise with a few to add water and to fill the boiler quite full. This can however, become a source of trouble. During the boiling process, most of the atmospheric gases, including Oxygen are evaporated out of the water. Adding cold water simply replaces these. This can be a starter for corrosion and if there is corrosion already present, it just helps to keep it going. One can readily understand wet storage in large installations, the cost alone can be enormous, but in no way can this be correlated to a model boiler in the belief that this will extend its life expectancy. This is sheer nonsense.

The quantity of water involved and its treatment, if necessary is not great. I have however, had a look at a number of boilers that have been wet stored and they show problems of varying degree. So let us take a look at what can go wrong. I am not suggesting that these boilers are in any way doubtful as to their service capability, but farther down the track it may be a different situation.

Much of Australian water contains large concentrations of various salts. During boiling these invariably come out of solution and settle on the inner walls of the boiler. These can develop a hard skin which becomes an insulation and greatly retards the transfer of heat through the firebox to the water. It was a problem for the railways in steam days. This is often seen in household kettles where the water is said to be 'hard'. Another point to remember is that it is virtually impossible to seal air out of a model boiler completely. This can help to promote corrosion at the water level, it can become quite heavy.

There is also another factor coming into the water of most model boilers. It is man made and it is chlorine. This is being added to domestic water in ever increasing amounts to eradicate bacteria. It has been used for this purpose for many years but the amount going into the water is now greater than ever. Fluoride and God only knows what else is going in, so it is quite a cocktail. The discovery of chlorine by K.W. Scheele of Sweden in 1774 remained for some time of little use. In 1810 the British scientist Davy, after much experiment, concluded that the substance was an element when no further decomposition of the gas was attainable. Davy gave it the name chlorine. It is one of man's most used products, but left in a model boiler, it can, because of its nature, become a mild electrolytic solution. This can be the precursor of corrosion problems and it if is allowed to become strong enough, it will certainly attack soldered joints, particularly if the solder used is low in Silver content. This is just one of the problems that is eliminated by dry storage.

I would mention here that the thin walled steel boiler that I made to experiment with, had during the use, only a very small amount of water treatment added to the water. During use, i.e. the firing session, which lasted about 4 hours at a time, many litres of water was put through and the water treatment spread out accordingly. It has now not been used for about 8 years and I took the manhole, sorry, dome cover plate off, as at time of writing September 2000, there was no sign of any problem there at all. After each steaming session this boiler was blown down and stored dry. I do not believe that a steel boiler fitted with copper tubes, is a source of electrolytic galvanic reaction when no prevailing cause is present.

Another possible source of future trouble is the copper itself. The quality of copper today is to say the least, questionable. Copper is now a very refined product and coupled to this, there is a lot of re-cycled material as well. I have become well aware in the past 10 years or so, that it is becoming a very difficult task to form plates etc. and it is also a similar situation for welding.

A few years ago, 3 annealings during the forming of a boiler plate was usually enough to complete a plate. It now takes twice this and it is a fighting job all the way. Problems also show up during the welding process. The weld itself often develops a thin hard skin which comes out of the molten pool in the form of gas porosity. This is a result of impurities in the copper itself. The use of a suitable flux is a big help here. It also shows to me that the TIG (Tungsten Inert Gas) is the preferred way to weld copper. Because of this I have done quite a few test pieces and I have to say in all fairness, not much seems wrong with the weld. After breaking the welds, they show no serious defects. However, with regards to today's copper, only time will tell if any boiler problems will be forthcoming.

This could be in the form of a fracture of tube ligaments or radiuses or some form of crystallization of the copper itself known technically as embrittlement. I have also used a dye penetration fluid to check on welds but nothing has ever appeared to cause concern. Looking back now and asking ourselves can we preserve, or do something to keep existing boilers in good condition, the answer is — yes we can. For a copper boiler that is using **town water**, there are two very simple remedies that can be of great help.

No.1 is the use of a small amount of malt vinegar. About 5cc/lt water is quite strong enough. Water that tends to be of a lime or alkaline nature responds well to this. It also helps to keep injectors and clack valves clean and trouble free.

No.2 is the use of a small amount of plain old washing soda. 1/2 cupful used during a day's run is a great help to water from areas known to be acidic. Washing soda is a great neutralizer. It also softens hard water and imparts to it a slippery nature. There is no way these treatments will harm a boiler for they are not like strong solvents. They do not need to be used every time the boiler is fired up. Used for half the number of runs a year is usually quite sufficient. If however, you are one of those lucky people to have clean unadulterated rain water, you will probably never need to add anything. I know of a boiler that after 10 years running was spotless. Steel boilers are usually treated with some form of propriety product — for my money tannin is as good as any. Keep in mind the golden rule, how your boiler performs at the end of the day is in direct proportion to its past treatment.

Summary

What do I think about this matter. My answer here is straight forward. A boiler that is well made, of good design, copper or steel or a combination of both, if given reasonable care, will be trouble free for many years. You may ask, what constitutes a good boiler.

No.1: As much internal space as possible for water and steam.

No.2: Foundation Ring and tube spaces as large as possible.

No.3: Sufficient number of inspection plugs and at least 1 blowdown plug at the lowest position available.

No.4: An insulated boiler is better than one that is not. Retention of residual heat assists in slower drying.

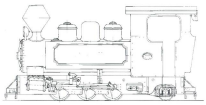
No.5: The use of a low wattage light globe in the firebox is also useful in areas of damp atmosphere, particularly in winter or long cold periods. A 30 watt globe is usually all that is required.

I do not favour 'wet' storage for model boilers. I have a lot of evidence against this. Locomotives or traction engines stored in a dry and reasonably well ventilated building will give very little trouble boilerwise.

In bringing this paper to a conclusion, I would like to mention just a couple of points of interest to our readers. They are as follows. It is one of those subjects that is not as easy to write about as one may think. We have such a wide variety of people who are our readers and also members of our fraternity, but not necessarily with an engineering background. It is quite easy for the like of me to go off and use words and terminology suitable for a lecture at a technical college or other such establishment, that would be self defeating. My hope is that I have given information useful to our readers in general, of whatever background.

If something has been gained by all, then I have all the reward I need.

Bunyip



A Bundaberg Fowler 0-6-2T in 7¼" gauge — part 18

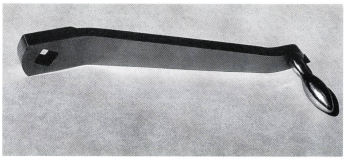
by Ian Smith

Drawings and photos by the author unless credited otherwise

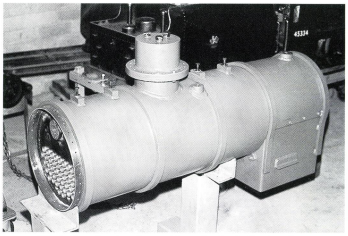
Make the two delivery pipes to the cylinders out of 12.7mm diameter (½") copper pipe. Bend the pipe to shape, do not make the bends too sharp, and flare the ends.

Regulator handle

To make the regulator handle, use a piece of 30mm wide x 12mm thick x 210mm long BMS or stainless steel. Drill a 12mm hole, 20mm in from one end and in the centre of the bar. Taking a combination square, use the 45° to mark out the 12mm square. The corners of the square are along the centre line of the bar — make it a tight fit on the regulator rod. On the other end come in 8mm and in the centre centre-pop, drill and tap M6. Using the square, scribe a line across the bar 40mm from the end with the 12mm square hole in it, clamp the bar to the milling table and machine the bar down to 8mm thick to the scribed 40mm line. Take an off-cut of 16mm diameter and turn a small 5mm diameter end on it which will go in to the tapped hole. Put it in the hole, lay a rule up against the outside diameter and against the edge of the 40mm and scribe a line from the 40mm to the 16mm diameter on both sides and around the top end of the bar. Cut to shape and bend from the 40mm machine step and 25mm from the small end to give it a 50mm offset. Out of a piece of 16mm diameter BMS, turn to 6mm x 8mm long and thread M6 on one end, now turn a nice shape on the next 50mm length and part off, draw file the handle and fit to the regulator rod with a 10mm washer and a M10 dome nut, that finishes the regulator.



Regulator handle

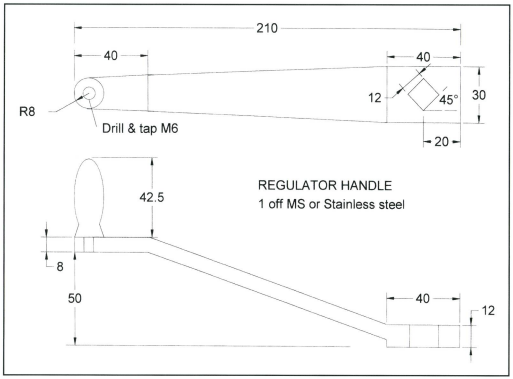


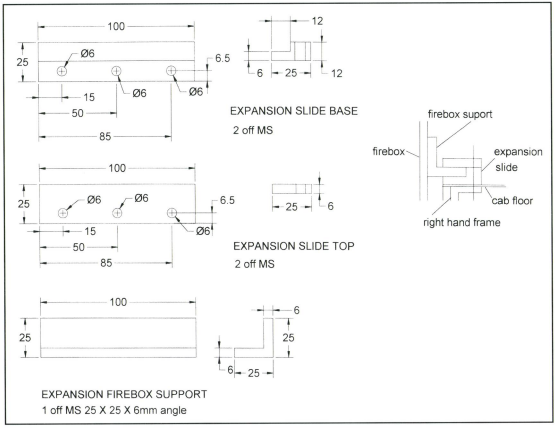
The boiler showing the positions for the boiler bands as well as the expansion brackets

Expansion and firebox support

This is made out of two pieces of 25mm wide x 12mm thick x 100mm long MS and two pieces 25mm wide x 6mm thick x 100mm long MS for the slides and two pieces of 25mm x 25mm x 6mm thick x 100mm long MS.

Mill a 12mm wide x 6mm deep step along the two 12mm thick pieces. On the unmachined surface mark out the bolting holes, mark a line down the centre of it, come in 15mm from each end and in 50mm from one end and drill the three 6mm diameter holes. Clamp one 6mm piece to it and drill the three 6mm holes, repeat on the other pieces. Bolt the slides together and try the angle flange in the slot to see if it will slide freely. Clamp one slide with the top off to the side with the reversing lever on flush with the inside of the frame and 10mm from the edge of the cut-out in the angle of the reversing bracket and drill the three 6mm holes. **(NOTE:- the position of the mounting angle for the**





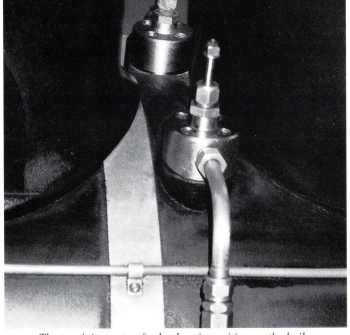
reverser needs to come out 6mm from what was stated in part 13 (issue 91, page 51). The drawing in part 13 is correct). Drill the other one on the other side of the frame in the same position and make up a 1.5mm sheet packer to put under the expansion slides until you make the cab floor.

Bolt the two slides without the tops on them, with the boiler set true to the frames and in the centre lay the 25mm x 25mm x 6mm thick angle in the slide and check the fit. There should be a 1.5mm clearance between the edges of the angle and slide to allow for side ways expansion of the firebox. If not, machine the edge. To hold the angle in position to tack weld to the firebox, lay a strip of photo copy paper on top of the angle and clamp on the top of the slide — that will hold it in position for tack welding.

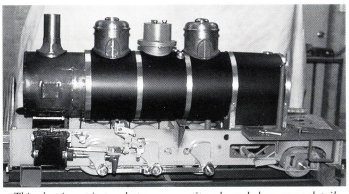
Boiler cladding

To clad the boiler, roll up three rings out of 25mm wide x 12mm thick x 1.1m (approximate) — they are to go around the boiler barrel. Two of them will need to be cut in half to fit around the boiler barrel and a small weld prep ground on the cut. Be careful to not touch the boiler barrel with the welding. One is put at the start of the boiler barrel, another in front of the steam dome and one after the infeed bosses on the barrel and before the bolting blocks for the sand dome. There are another two bands to go over the firebox. Run your tape around the top of the boiler and over the firebox from one side of the frame to the other side frame. Roll and bend the two pieces to the shape of the firebox, they are only lightly welded to the firebox. The one that goes on the backhead end is welded with 16mm over hanging the backhead, the reason for this is so the backhead can have cladding to give a smooth finish. The cladding will be fitted when the water gauges are made.

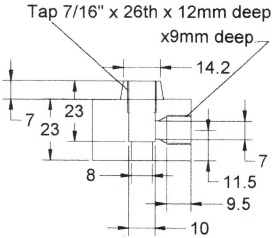
The insulating material used was Katowool® ceramic fibre LT Batt (they come in 25mm thick x 610mm wide x 900mm long). It is cut to fit in between the rings and compresses to 12mm thick when the cladding is clamped down on top of boiler rings and gives a maximum service temperature of 900°C in use. The cladding is cut out of 24 gauge (0.5mm) galvanized sheet. It was cut into three pieces so it was easy to fit around the boiler and fittings. The join for the cladding is top and bottom of the barrel — a tag fits under the first boiler band on the firebox so the join is not seen, the third piece of cladding goes over the firebox. There is a cut-out in the side of the cladding where the reversing lever comes too close to the boiler and another under the barrel where the weigh shaft travels under the boiler. The boiler bands are made out of brass 25mm wide x 1.5mm thick strip, bent at right angles on the ends with a 10mm square x 25mm long piece silver soldered in on each end. There is a M5 hole tapped in one end and in the other end a 5.5mm diameter hole is drilled. I



The two injector top feed valves in position on the boiler

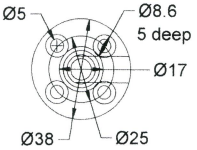


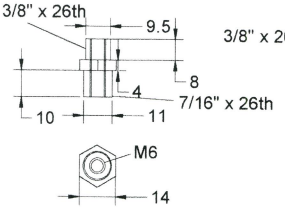
This shot is put in to whet your appetite, oh, and show some detail



INJECTOR TOP FEED VALVE BODY

2 off bronze or stainless steel

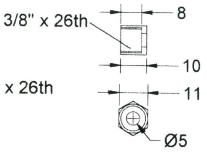




CENTRE PIECE FOR VALVES

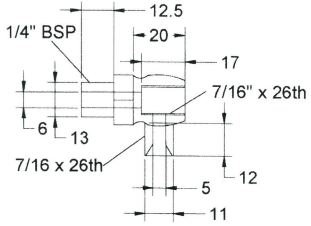
2 off bronze injector top feed

6 off bronze manifold valves



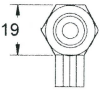
GLAND NUT

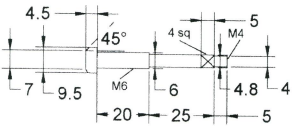
8 off bronze



MANIFOLD VALVE BODY

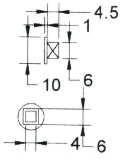
6 off bronze





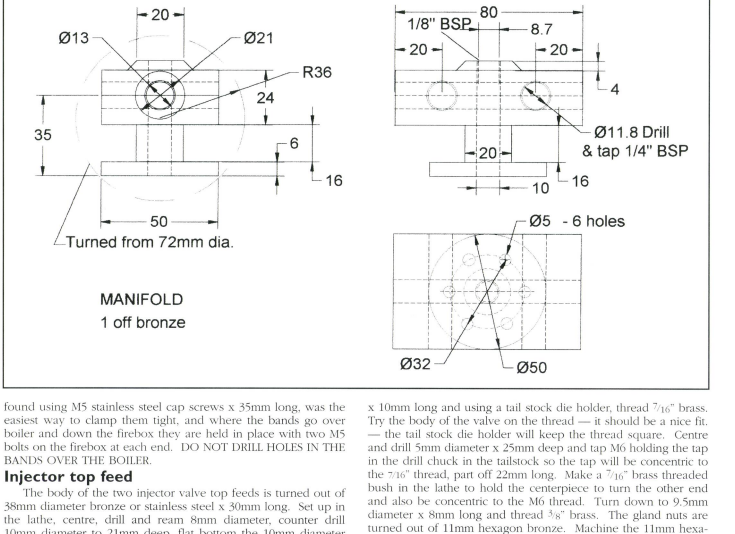
INJECTOR TOP FEED VALVE SPINDLE

2 off stainless steel



END CAP

2 off stainless steel



found using M5 stainless steel cap screws x 35mm long, was the easiest way to clamp them tight, and where the bands go over boiler and down the firebox they are held in place with two M5 bolts on the firebox at each end. DO NOT DRILL HOLES IN THE BANDS OVER THE BOILER.

Injector top feed

The body of the two injector valve top feeds is turned out of 38mm diameter bronze or stainless steel x 30mm long. Set up in the lathe, centre, drill and ream 8mm diameter, counter drill 10mm diameter to 21mm deep, flat bottom the 10mm diameter drill and go to a depth of 23mm. Holding a $^{7}/_{16}$" brass intermediate tap in the drill chuck tap to 12mm full thread deep. Turn to 16.5mm diameter x 7mm long, set the compound slide to 3° and turn a taper on the 16mm diameter till the taper finishes at the 16mm diameter. Part off the 38mm diameter body 23.2mm long, reverse in the chuck and face off to 23mm long. Get a good finish on the final cut and debur the 8mm diameter hole. Using the drilling jig you used to drill the bushes for the boiler, open out the holes to 5mm, counter bore the holes 8.6mm diameter to take the head of the M5 cap screws x 5mm deep — the tops of the heads should be flush with the top of the body. The position of the pipe from the injector is in-between two of the 5mm diameter holes. There is about 12.5mm of metal between the two holes so with careful marking and drilling you will not have any trouble. Come up 11.5mm from the bottom of the body and in the centre between the two 5mm diameter holes drill a 7mm diameter hole then open out to a 10mm diameter hole 9.5mm deep. Before shifting the setup, put a centre drill, or sharpen the 10mm diameter drill to 60° point, in to the drill chuck and taper the bottom of the 10mm diameter hole to take a tail fitting. Change to the $^{7}/_{16}$" brass intermediate tap and start the thread, then change to a plug tap and go nearly to the bottom of the hole (9mm) and DO NOT hit the 60° chamfer with the tap.

To make the centre piece of the valve use 16mm diameter continuous cast bronze. You will find it is about 1mm + over size so it will machine to 16mm diameter. In the lathe, centre one end then put the bar in the dividing head and the centre in the other end and mill a hexagon 14mm across the flats, machine the whole bar. Also there are the six turret valves to make that use the same centre piece so make eight at the same time.

Put in the three jaw chuck and turn down to 11mm diameter x 10mm long and using a tail stock die holder, thread $^{7}/_{16}$" brass. Try the body of the valve on the thread — it should be a nice fit. — the tail stock die holder will keep the thread square. Centre and drill 5mm diameter x 25mm deep and tap M6 holding the tap in the drill chuck in the tailstock so the tap will be concentric to the $^{7}/_{16}$" thread, part off 22mm long. Make a $^{7}/_{16}$" brass threaded bush in the lathe to hold the centerpiece to turn the other end and also be concentric to the M6 thread. Turn down to 9.5mm diameter x 8mm long and thread $^{3}/_{8}$" brass. The gland nuts are turned out of 11mm hexagon bronze. Machine the 11mm hexagon as for the centre pieces and centre and drill 5mm x 12mm deep. Counter drill 8.5mm diameter and flat bottom the drill to a depth of 8mm and tap $^{3}/_{8}$" brass before parting off. Using a small 3mm radius turning tool turn a radius on the start of the nut to the full depth of the hexagon and part off 10mm long. With the same radius tool turn the same radius on the other end — it gives the nuts a nice finish.

The valve spindle is turned out of 10mm diameter stainless steel. Set up in the lathe in a 10mm diameter collet with 51mm protruding. With a small centre drill, centre the end and turn to 6mm diameter 50mm long, then turn the first 32mm to 4.8mm diameter. Now turn the first 5mm to 4mm diameter. Using a 2mm wide parting tool move the tool to the other end of the spindle and under cut the 6mm diameter to 4.8mm diameter x 2.5mm to allow the run out of the screwing tool. Set a 60° "vee" screw cutting tool but before cutting the thread with the 60° "vee" tool, use it to chamfer both ends of the 6mm diameter to give a professional finish to the thread. Now screw cut the M6 x 1mm pitch, using the valve centre piece as a gauge. It should not be a tight fit on the thread but a running fit (i.e. not a sloppy fit). You can use a M6 die in the tail stock holder when you are near full depth (0.61mm) that will clean the burrs off the top of the thread. The reason for screw cutting is the thread has to be concentric to the spindle. Use the tail stock die holder to cut the 4mm diameter thread on the end of the spindle, move the spindle out of the collet another 10mm, and part off leaving a 4.5mm long valve head. You only need two valve spindles 50mm long make the other six 45mm long. Using a 6mm diameter collet hold on the M6 thread and turn the head of the valve to 9.5mm diameter on the two long valve spindles and turn the other six to 8.5mm diameter. Set the compound slide to 45° and turn the two long valve spindle heads till the small end of the taper is 7mm

diameter and the other six are 5mm diameter. Make a M6 split bush 20mm long using the collet in the lathe so the valve spindles can be held in the dividing head, and using a centre in the end of the spindle to support the end so it will not bend when machining a 4mm square on the end x 5mm long. To make the end caps for the valve spindles for the injector valve, using 10mm diameter stainless steel turn a step 8mm diameter x 4.5mm long and centre and drill 4mm diameter. Before parting off, set up in the dividing head and cut a 6mm square 4.5mm long, return to the lathe and part off 5.5mm long. Make two off. With a square needle file, file the 4mm hole to a 4mm square, making it a tight fit on the valve spindle. Assemble the valve spindle and the valve centre piece, fit a 5mm inside diameter Viton "O" ring on the spindle and the gland nut to the centre piece, fit the end caps then fit a 4mm stainless steel nut. Check to see that the valve spindle head comes up against the centre piece and fit the assembly to the injector feed body. The valve stem when screwed into the valve will shut off. Fit the assembly to the boiler.

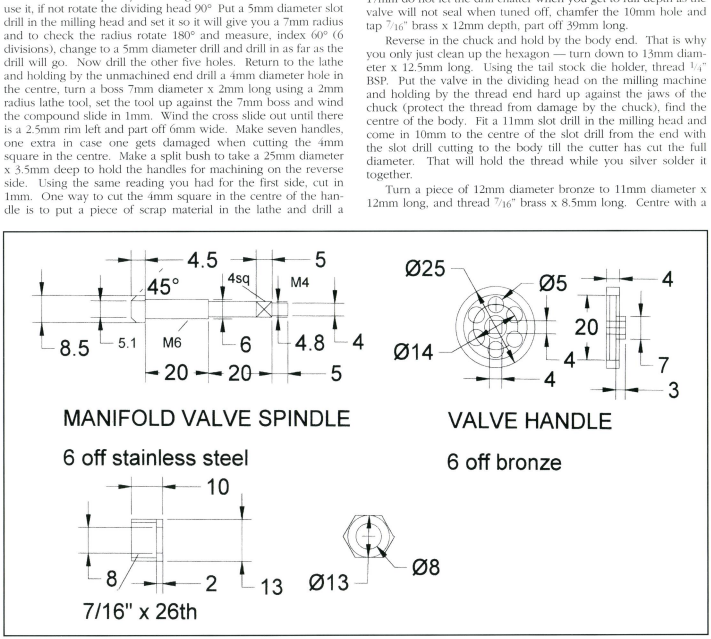
The handles for the six turret valves are turned out of 25mm diameter brass. Cut off a piece about 100mm long, face one end and centre. Set up in the dividing head on the milling machine, set up a 6mm diameter (3mm radius) ballnose slot drill in the milling machine head, set the cutter on centre and take a cut 0.5mm deep for about 70mm, index the dividing head 15° (24 divisions) and machine the rest of the grooves there should be small flats at the top. If your milling machine head will rotate 90° use it, if not rotate the dividing head 90° Put a 5mm diameter slot drill in the milling head and set it so it will give you a 7mm radius and to check the radius rotate 180° and measure, index 60° (6 divisions), change to a 5mm diameter drill and drill in as far as the drill will go. Now drill the other five holes. Return to the lathe and holding by the unmachined end drill a 4mm diameter hole in the centre, turn a boss 7mm diameter x 2mm long using a 2mm radius lathe tool, set the tool up against the 7mm boss and wind the compound slide in 1mm. Wind the cross slide out until there is a 2.5mm rim left and part off 6mm wide. Make seven handles, one extra in case one gets damaged when cutting the 4mm square in the centre. Make a split bush to take a 25mm diameter x 3.5mm deep to hold the handles for machining on the reverse side. Using the same reading you had for the first side, cut in 1mm. One way to cut the 4mm square in the centre of the handle is to put a piece of scrap material in the lathe and drill a 5.5mm diameter hole in the centre and counter bore 25.1mm diameter by 3mm deep. Grind up a 4mm square (broach) on a piece of 6mm diameter high speed steel long enough to fit to the full depth of the drill, chuck with the 4mm square end about 10mm long. Put the spare handle in the piece you have just machined with the boss sticking out and the 4mm square tool in the tail stock chuck and lock the tail stock and wind the 4mm square broach through the handle. Check for fit on the spindle, if too loose or tight, regrind the broach to fit. Now you have made the six handles make a larger one to fit the injector top feed valve cap but make it a sliding fit in the 6mm square. The handle is not fitted to the valves all the time because they might get turned off and on. The only time the valve will be turned off is if the water feed clack valve is leaking and you need to replace or repair it while in steam.

Manifold valves

The six valve bodies are turned out of 22mm diameter bronze. First machine the bar to 19mm hexagon in the milling machine. Grind up a nice shape-form tool to machine the outside of the body of the valve 20mm long on the left hand end of the form tool grind a 3mm radius it will give a nice finish where the hexagon starts, plunge cut in with the form tool till the hexagon only just cleans up face and centre and drill 5.9mm x 40mm deep and ream 6mm diameter counter drill 10mm diameter about 14mm deep then with 10mm diameter flat bottom drill, drill to a depth of 17mm do not let the drill chatter when you get to full depth as the valve will not seal when tuned off, chamfer the 10mm hole and tap 7/16" brass x 12mm depth, part off 39mm long.

Reverse in the chuck and hold by the body end. That is why you only just clean up the hexagon — turn down to 13mm diameter x 12.5mm long. Using the tail stock die holder, thread 1/4" BSP. Put the valve in the dividing head on the milling machine and holding by the thread end hard up against the jaws of the chuck (protect the thread from damage by the chuck), find the centre of the body. Fit a 11mm slot drill in the milling head and come in 10mm to the centre of the slot drill from the end with the slot drill cutting to the body till the cutter has cut the full diameter. That will hold the thread while you silver solder it together.

Turn a piece of 12mm diameter bronze to 11mm diameter x 12mm long, and thread 7/16" brass x 8.5mm long. Centre with a

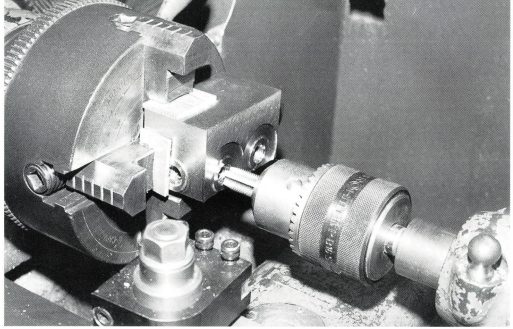


Axle Box Bearings

Due to the numerous enquiries — the bearings I use are NSK 6907 ZZ (in NSK catalogue also NTN cat.)

8mm diameter centre drill, feed the centre drill in nearly to the end of the 60° for the tail fitting and drill 5mm diameter x 13mm long and part off 11.5mm long. Make six off.

Clean the valve bodies and threads and flux the two parts and assemble and silver solder. To clean up the valves after soldering mix up some citric in warm water and soak the valves and clean up with a Scotch Brite® pad. Drill the 5mm hole through the body using the threaded end as a guide and remove all the burrs. Make the six nuts for the pipe work to the drawing the same way the gland nuts where made. Assemble all six valves the same as for the injector valves — do not screw the valves into the manifold when you make it, as the valves have to face different angles.



The manifold body mounted as per the various steps described, in this case, threading

Steam manifold

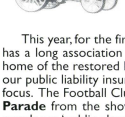
The steam manifold can be machined out of a solid piece of 72mm diameter solid extruded bronze x 82mm long. Set up in the vice on the milling machine and machine two opposite sides to 50mm thick and machine only one other side till it cleans up to the machined edges on the sides, machine both ends to 80mm long. Mark out the holes for the valves 35mm up from the bottom face and in the centre of the 50mm width on the ends, and 20mm in from both ends on the sides. Using a Vernier height gauge, mark out the holes in the manifold and lightly centre punch the centre. Set up in the four jaw chuck to the centre marks using the tail stock centre, using some scrap aluminum to protect the machined surfaces on the manifold under the jaws. Centre and drill 11.8mm diameter, only drilling half way through the manifold. Before tapping, take a light cut off the front face so the valve body will lock up on a square face to 21mm diameter. Now take another cut using a small radius tool about 0.2mm deep and machine up to the 21mm diameter, chamfer the 11.8mm diameter hole and tap $^1/_4$" BSP x 15mm deep. Repeat on the other five holes but be careful when machining the two on the sides. There will be a little bit left that will have to be removed by a file.

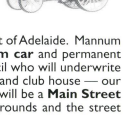
Turn the manifold over and machine the top face, turn a 20mm diameter boss on top and centre and drill 8.7mm diameter. Chamfer the hole and tap $^1/_8$" BSP in to the 11.8mm diameter through hole. Reverse in the chuck and turn down to 50mm diameter x 22mm long. With a parting tool, come in 6mm from the base and machine a recess 20mm diameter x 16mm long, centre and drill a 10mm diameter hole till it goes in to the 11.8mm diameter hole.

To drill the six 5mm diameter holes in the manifold, line the holes on your drilling jig up on the mounting boss holes on the boiler, sit the manifold on top with the 80mm length along the boiler, mark both the drilling jig and manifold boss. Take off the boiler and put a 10mm diameter pin in the centre hole, line up the marks and drill the six holes and then open out to 5mm diameter. The manifold can be held down with M5 bolts or make six studs and bolt down with nuts.

To be continued ...

13th Australian Miniature Traction Engine & Steam Road Vehicle Rally





Mannum, South Australia

13 to 14 October, 2001

This year, for the first time, the rally is being held in South Australia at Mannum, on the Murray, 100k east of Adelaide. Mannum has a long association with steam, the birthplace of the **Murray paddle steamers**, the **Shearer steam car** and permanent home of the restored **PS *Marion***. The rally is already being strongly supported by the Mid Murray Council who will underwrite our public liability insurance and open the Showgrounds where the Mannum Football Club have their oval and club house — our focus. The Football Club have a **bottomless coffee pot** and will cater the Saturday evening meal. There will be a **Main Street Parade** from the showgrounds to the town centre and return from 11 am on Saturday. As the showgrounds and the street parade are 'public places' all self propelled machines must hold a Transport SA exemption permit to run and these will be obtained through registration for the Rally. Late registrations with no permit will only be able to operate as static exhibits — so the idea is — ***get in early!***

Rally entry, registration, meals, etc. will be available upon request from 1 May 2001

For and further details, contact the Rally Organiser, John Levers (08) 8569 2842

Sparks 'n' Arcs

Model Electric Locos in Tasmania

by Chas Goodwin

Photos by the author, drawing for publication by Dave Adams

During 1986 I decided to experiment with electric power, an interesting exercise after having built a live steamer.

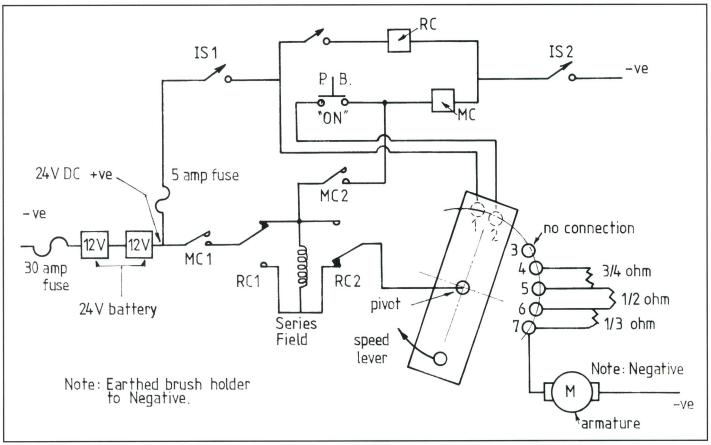
My loco is a 2-4-2, this being the wheel arrangement of some Tasmanian rail motors, with outside coupling rods connecting the two axles. The loco has 6" driving wheels, powered by an Australian Lucas C40 generator with the field coils rewound with 32 turns each coil with two wires in hand of 1.1mm gauge to give series working. The 1.1mm gauge wire was all I could get at the time but I have since wound similar motors with single wire 1.8mm gauge. The transmission is chain drive with a countershaft and an overall ratio of 9.6:1.

Control equipment is made up from gear in my rather extensive "junk" box and the circuit is as per the **drawing**. Two 24 volt 30 amp DPDT contactors from an obsolete computer are used for control switching. Control wiring is the wiring from a junked car. Motor and controls are powered from two 12 volt batteries (24 volt).

The main contactor MC is operated by pressing push button PB, the circuit being completed via isolating hand switch contacts IS1 and IS2 and contacts 1 and 2 closed by the speed control lever at the "OFF" position. MC cannot be operated unless the speed lever is "OFF". Contactor MC is held operated or latched via its own contacts MC1, MC2 and RC1.

The reverse contactor RC, when off or relaxed, switches the motor field for forward travel. Contactors RC, when operated by reverse switch RS, reverses the motor field for reverse travel.

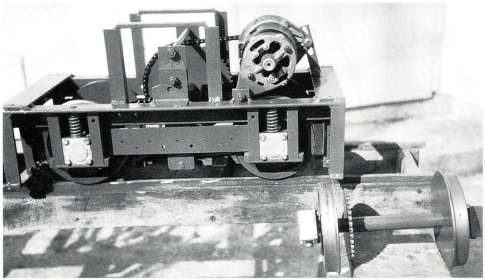
The 7¼" diesel electric loco with the ventilation grill for engine cooling at the full height of the body. It has since been panelled half the height of the grill.



The speed control lever is a semi-rotary type where the blade wipes across the contact studs which are brass screws with the heads filed flat. The main fuse is in the negative battery lead because of the rather long lead between the two 12 volt batteries; in case of shorts to earth (-ve). The controls are rather simple but quite effective

The loco was intended for solo use but can haul one loaded carriage. It has also been used for hauling a ballast wagon and was then shoved in the shed for a few years with batteries removed and looked after by a solar cell. It's now on loan to a friend and it is nice to see it going again.

I mentioned that I had since wound similar motors. Two of these were English-made C40 generators which have a smaller coil section. I put 39 turns on but found the current was restricted, due I suspect, to stronger magnetism and back EMF. These motors became part of a 7¼" gauge diesel electric loco with a 5HP Honda motor driving two 24 volt alternators at 1:2 ratio. The electronic regulators were replaced with just two wires to permit higher voltage. Two 4-wheel bogies, a ratio of 11:1 via a countershaft to 6" dia. Wheels, a maximum starting current of 10 amps and a running current of 7.5 amps could haul two 8-foot loaded passenger carriages. The original



A bogie and an axle showing the drive gear. There is a plate across the top of the four uprights to carry the pivots on which the locomotive body is mounted

ratio was 10:1 but it was too fast for 30' radius curves so I fitted smaller sprockets on the motors (gave a bit more tractive effort too). This loco had an electrical circuit that works with the throttle and engine revs to increase power and speed. I extract some current off one alternator to charge the battery, which is not terribly successful as charging only occurs when driving. It would be better with a 12V alternator installed.

Have you tried electric power in any of your models?
***Sparks 'n' Arcs* readers would like to hear about and share your experiences.**

Beyond 7¼"

by Lee Rodda

In this hobby for many years there has been a steady trend towards more ambitious and larger railway models. This may be due to a number of factors including the experienced members in the hobby taking on progressively more challenging projects, the wider interest in the hobby bringing in those with more personal resources to enable participation to be at a more substantial level, and the need to cater for larger passenger loadings on an increased number of larger scale operations on longer tracks both club and commercial. This subject has been canvassed in *AME* in Keith Watson's article of March-April 1997.

Another unrelated development in engineering practice generally is the gradual adoption of the metric system in material sizes, tooling, and eventually, the thinking of the modeller. A growing interest in the modelling of internal combustion powered prototypes of later eras alongside the traditional steam, also adds to the long-term trend to thinking, designing and building to non-imperial dimensions. On the other hand, there is already in place a wide selection of long established imperial track gauge standards which ought not, in any circumstances, to be further increased in number.

For those wishing to move beyond 7¼" gauge building and operation, there are few clear established guidelines. There is a certain "chicken and the egg" difficulty in that builders will be reluctant to produce motive power for a larger gauge where there are no tracks to run it, and clubs will not lay down track in a size where there is no immediately available stock to use it. One result of this stalemate has been more and more massive locomotives on 7¼" gauge, generally to heavy North American narrow gauge outline, and a strong inhibition against creating larger scale models of mainline practice, including Australian prototypes of which there are many fine examples in the smaller scales.

The beginnings of a breakthrough against this stalemate may be emerging in the appearance of several examples of 12" gauge inside-framed variations of some of the popular outside-framed 7¼" gauge designs such as the standard products from the Western Australian small commercial producers.

Beyond 7¼", there are several possibilities of gauge standards to be explored. In 10¼" there have been very few models produced in this country and this size now appears to be dormant. However in 12" gauge there have been club tracks which encouraged the construction of a number of larger locomotives which are still in active use, and this may be the next larger size to be in the ascendancy again before long. Above 12" gauge, the possibilities which have some current useage are 15" and 18", the former with British modelling origins and with its most notable application in Australia being the Bush Mill line in Tasmania. The 18" standard had its roots more in light industrial and mining use although in Australia there are now several examples in Adelaide in regular operation in museum and public environments, and in Sydney in seasonal amusement service.

Drawing together these factors, a suggestion is offered for one rational scale factor to make the link between a range of prototype track gauges and the most common miniature gauges.

The suggested scale ratio of 1 : 3.5 provides the following relationships.

- 24" gauge prototype on 7¼" track — *track gauge 5.7% broader than true scale*
- 3'-6" gauge prototype on 12" track — *exact scale ratio*
- 4'-8½" gauge prototype on 15" track — *model size 7.6% larger than scale on that track*
- 5'-3" gauge prototype on 18" track — *exact scale ratio*

As an illustration of of this philosophy, this scale ratio was applied to the dimensions of what would be one of the smallest broad gauge prototypes, "I" Class locomotive number 38 (later 48) of the South Australian Railways. This was built by Neilson of Glasgow in 1873 for the Canterbury Railway in New Zealand and susequently sold to South Australia. It is an attractive little "colonial" 0-4-0 tank loco of under 12½ tons. In 1:3.5 scale, its key dimensions become:-

Overall length	1585mm	(62½")
Wheelbase	500mm	(19¾")
Driving wheels	254mm dia.	(10")
Cylinders	65mm x 116mm	(2⁹/₁₆" x 4⁹/₁₆")
Boiler	282mm dia	(11⅛")
Scaled mass	294 kg	(646lb)

in theory, a little under 1/45 of the prototype's weight. In practice given over-thick sections, perhaps a little more.

For something even more basic and historic, a model of Stephenson's *Rocket*, all within the width of the (15") gauge, would be not much more than a "wheelbarrow" sized project.

In the area of internal combustion powered motive power, the most "minimal" prototype might be a model of the Victorian Railways shunting tractors. A 1:3.5 model on 18" gauge would probably employ as "appropriate technology" the drive train of a Rover Colt 5hp ride-on lawnmower.

At the other end of the scale, a model of an SAR 520 Class locomotive in 1:3.5 scale would be about 7.6m long (25ft) and weigh about 4.7 tonnes. Enough to keep most builders busy for a few weeks.

The next subject to be settled of course, would be wheel and rail standards. The South Australian practice in 18" gauge has been to adopt fairly coarse standards of roughly ½ the full size dimensions, in consequence of the ready use of surplus main-line rail and point components. No doubt this will be the subject of lively debate in the years to come.

A Few Basic Workshop Tips

Don't Fight Your Four Jaw

Trying to true up something in the 4-jaw independent lathe chuck can take such a lot of time and then it is truly hit and miss to win first time. Here is one way to do it without a dial test indicator.

With the lathe stationary, line up the jaw facing you and wind the tool in till it touches the job, take a reading on the cross slide indicator (on newer lathes the sleeve can be adjusted to zero). Turn the chuck 180 degrees and correct the difference till both readings are equal. Next, turn the chuck 90 degrees and repeat the action. Further accuracy is accomplished if you use a packing strip of wood or metal under the jaw of the chuck before touching the tool for the readings. This method gives greater accuracy when truing up square material.

— John Brighton

Keyless Drill Chucks

If you have trouble with the drill stopping when drilling, try this! Close the chuck on the drill, then open it half a turn, start the drill, then turn it off and when the drill has slowed enough, grab the chuck and then let go. A simple and quick act that does the trick.

— Ed Murrell

A 'Graduated' Tailstock

On my lathe there are no graduations on the tailstock spindle but I have a circlip sitting on the spindle to zero the depth of hole I want to drill. When I set the drill to the job I adjust the circlip against the casting and start drilling. This record the depth of the hole being drilled.

— John Brighton

A Rail Straightener

by Peter Dawes

Drawings prepared from the author's originals by Tim Smith

The commonest defects in ground level rail are downward bends caused by vehicles being driven over them. This little hydraulic bender is designed specifically to fix such bends in 10 x 25mm rail. Upward kinks are uncommon but if they occur are best hammered down with a heavy hammer.

The jack

The main component is a 1.8 tonne hydraulic jack. The smallest Chinese jack cost me about $28. A small footprint is desirable in order to keep the machine small, and this one has a base about 9.5 x 8mm. Its minimum height is 153mm (6 1/8"). There is a sticker for the Australian firm of *Toolmac* affixed. This company is probably the importer.

The dimensions of the rail bender are mainly dictated by the jack, and especially by the dimensions of its base.

The "long bar" is 40 mm square tube with the thickest wall that you can obtain — e.g. 2.5 or 3mm. I could only get 1.6mm which also seems to be OK. It is approximately 450mm long.

6mm thick strips are welded to its sides in the middle, FLUSH WITH THE TOP FACE, to form a face to which the jack is bolted with is centre over the bar centre. Two 9/16" guide holes are drilled in the outside edges of the strips for the long bolts.

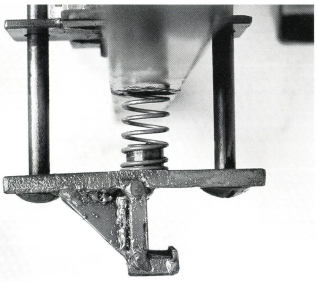
The top "crossbar" is 32 x 2.5mm square tube. It's dimensions are not critical but the holes for the bolts must be the same spacing as those in the long bar and in the bottom cross bar. In fact, it is best to drill these first and then drill the others off it. My bolt holes came out at 4.25" apart c/c.

A socket for the top of the ram is made by drilling a hole in a short piece of 6mm steel the same width as the tube. The hole is drilled a clearance diameter for the ram. The spring (see below) should keep it in the socket. The plate is then welded to the crossbar, while maintaining alignment.

The two movable "outriggers" are 50mm square tube x 4mm wall about 40mm long. That size happens to be a good fit on 40mm tube. The outriggers carry 3/4" diameter rollers running on high tensile 5/16" bolts or capscrews between guide strips as shown in the photos. The spacing should be about 12mm.

The bottom crosspiece, the "hook bar", has a substantial "hook" welded firmly to it underneath. The best material for these pieces would be high tensile steel if you can get it. I could only manage mild steel.

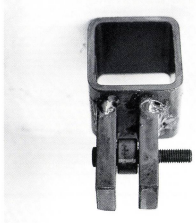
Two old 12" x 1/2"W coach bolts were used to hold it all together but threaded rod can also be used. If not using a cup head coach bolt then the bolt should be tapped into the hook bar to minimise the obstruction that a nut would produce underneath.



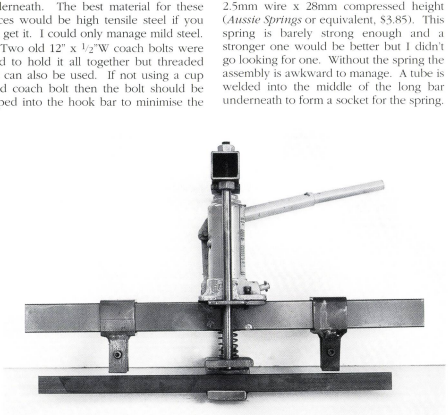
This is what the hook bar looks like side-on

The spring

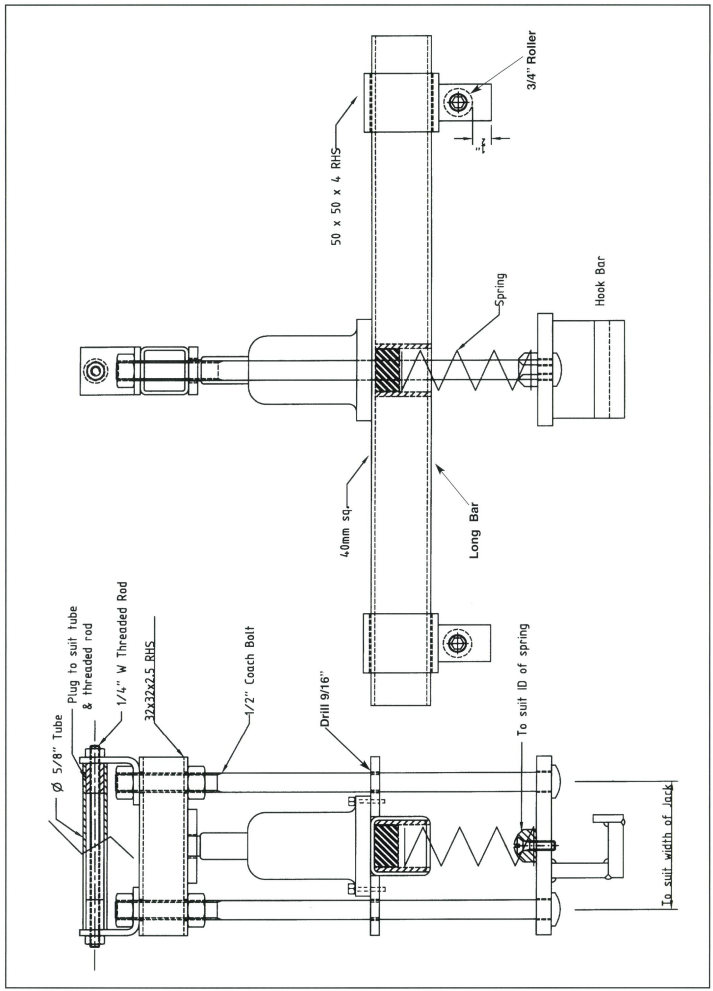
This requires special comment. The hook bar is kept pushed down away from the long bar by a compression spring 28mm OD by 76mm long x 22mm ID x 2.5mm wire x 28mm compressed height (*Aussie Springs* or equivalent, $3.85). This spring is barely strong enough and a stronger one would be better but I didn't go looking for one. Without the spring the assembly is awkward to manage. A tube is welded into the middle of the long bar underneath to form a socket for the spring.



One of the movable outriggers



A front-on view of the completed rail straightener


Ø 5/8" Tube
Plug to suit tube & threaded rod
1/4" W Threaded Rod
32x32x2.5 RHS
1/2" Coach Bolt
Drill 9/16"
To suit ID of spring
To suit width of Jack
40mm sq
Long Bar
50 x 50 x 4 RHS
Spring
Hook Bar
3/4" Roller

This socket is made from 1" gal water pipe bored out to clear the spring diameter. The hole for the tube is cut in the long bar with a 1⅜" diameter HSS hole saw. The tube is then welded flush into the long bar.

A loose spacer plug about 16mm long is dropped into the socket to pre-compress the spring slightly. The spring should just fit completely in the socket when it is compressed by extending the jack. Then the hook bar and long bar will be in contact. The length to make the plug therefore depends on your spring.

A 7/8" diameter x 1/2" long stud screwed to the top of the hook bar on the exact centre line of the spring, holds the spring in position at the bottom. The end of the stud should be bevelled to prevent the coils catching on the edge and the screw should be countersunk. I used a 5/16"W x 1" c/s screw but 1/4" or 6mm could also be used.

You can use any similar spring, in which case the socket and stud would be dimensioned to suit. The spring strength should be such that it can more or less support the weight of the long bar, the top crossbar and the jack, in other words, all the parts above the hook bar.

(Since building the bender, I have found a better spring. It is a US Century C-862, more expensive, but at 1065mm long, it allows the user to cut it to the exact length he needs, which in turn eliminates the need for the plug. The end should be ground square and flat.)

A convenient handle was added after some of the pictures were taken. Its brackets are made from 25 x 3mm flat stock, bent, and bolted down under the 1/2" nuts. The grip is 5/8" steel tube with plugs in the ends drilled 1/4" for a threaded rod that passes right through it. A nut at each end locks it in position.

The whole thing took me less than 2 working days to make once I had assembled the bits of steel and the bottle jack. That included the painting. I gave it a coat of Selleys RustFix® followed by a coat of sprayed enamel ($2 at discount houses).

Using the bender

Locate the centre of the bend and assess how sharp it is. The outriggers are spaced apart accordingly. For example, a badly welded rail joint that is effectively a sharp vee, should have the outriggers moved fairly close together. A very gentle bend would have them spaced out to the full length of the long bar. Long bends might have to be straightened in a series of steps. Note that the closer the outriggers are together the greater the force required to bend the rail so there will be a minimum distance set by the strength of the bender itself. Users will need to find this by experiment.

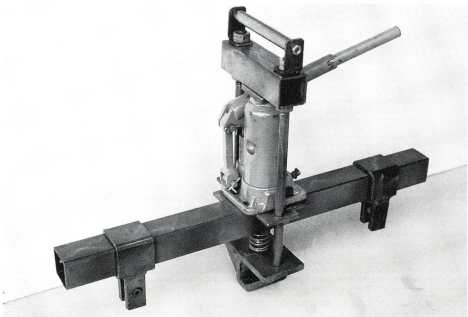
Moderately curved rail is not a problem because the hook and the two outrigger guides are somewhat wider than the rail. There should be enough free movement to accommodate gentle curves. Thick rail "joiners" however would be too thick to go in the hook. The hook would have to be placed to one or other side.

It takes a bit of practice to know how much force is required to correct a given bend. This is partly because the steel always springs back slightly, and because the outrigger spacing affects the force needed. Also, 20mm deep rail will be easier to bend than 25mm, and 9mm thick easier than 10mm.

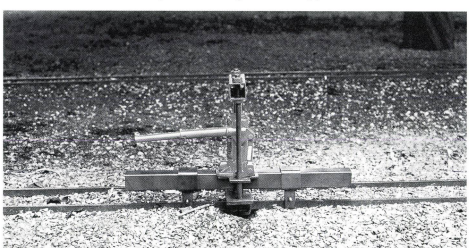
Accessories

A useful accessory is a flexible steel straightedge 38 or 50 x 3 x 1000mm approx with "guides" at each end and in the middle. The guides straddle the rail like those on the outriggers. They are simply two "leaves" that project 12-16mm down from the edge and are separated from each other by slightly more than the rail thickness. They hold the straightedge on top of the rail when the latter is curved.

Another useful tool is a "digger" to gouge out the ballast where the hook is to go under the rail.



The completed rail straightener is ready for use



In position on the Orange Society of Model Engineers track

An Easy Diamond Crossing

A while back I made a diamond crossing for the Euroa track, which took 45 minutes to complete. This is how it goes.

Take the main line as east-west (**ew**) and the line to cross it as north-south (**ns**). The **ew** rail is already in place. Lay the **ns** rail in its position over the **ew** rail and mark its position (a hacksaw blade is good). Just cut the corner of the rails, both sides and remove the **ns** rail. Take a piece of steel, at least 20 x 5mm and long enough to reach 20-30mm past the marks, clamp it under the rail and weld in place, but don't weld where the marks are. Cut the pieces out, rail width, at the marks, drop the **ns** rail in place and weld in. Finally, cut in the flange clearance with an angle grinder.

— Ed Murrell

Another Lathe Clutch

Story and photos by Peter Bowes

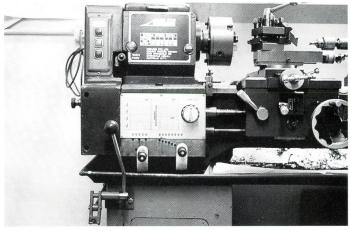
Drawing for publication from the author's originals by Peter Hall

My lathe is a Taiwanese machine, model SSB 10BS, 5.5" centre and 24" bed and I'm sure there are many of the same, or very similar out there. After using this machine for a very short time I realised what an advantage a clutch would be, as opposed to switching on and off every time a measurement needed to be taken on the workpiece.

Upon reading the article by Peter Dawes, *Australian Model Engineering* (Issue 69), I decided to venture along this system of loosening the drive belt. However it was not till early 2000 that I finally got around to carrying out this modification — also incorporating a system by which the motor could be mounted separately from the lathe, in an attempt to reduce vibration to a minimum.

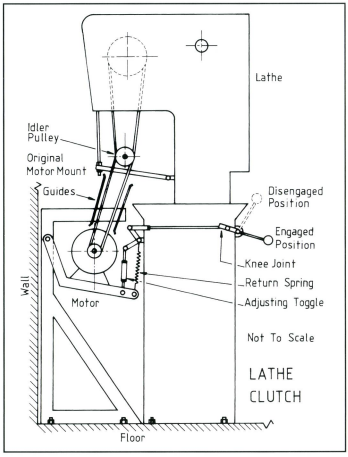
My lathe is not a geared head type, and speed changes have to be effected through a system of stepped pulleys and belt within the head, so certain dimensions of Peter's original design had to be changed, although the knee mechanism and $1\frac{3}{16}$" stroke were closely followed. However I did find that the two rollers as described, failed to contain the belt to clear the motor pulley properly, causing the lathe chuck to display an erratic creep, a very insecure feeling when ones hand is between chuck jaw and sharp cutting tool taking measurements. This creep could not be eliminated by any amount of positioning of the two rollers or available adjustment to motor movement. As I was mounting the motor separate from the lathe, the drive belt was considerably longer, and I'm sure this was the root of my problems, with the rollers not containing the belt in the right shape to clear the motor pulleys sheaves.

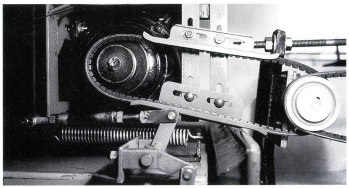
As serendipity would have it, at precisely this time my copy of *AME* was delivered, (Issue 89, article page 60, again by Peter Dawes), and this gave me the inertia to try guides, knowing that

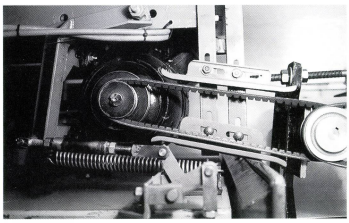


this system permitted the use of only one of the two speeds available on the motor pulley. However, during the ten years I owned this lathe I have yet to use the higher speed — it seems far too fast for the SSB 10 BS lathe. Should the need arise I would have no option but to reverse the motor pulley and adjust the guides.

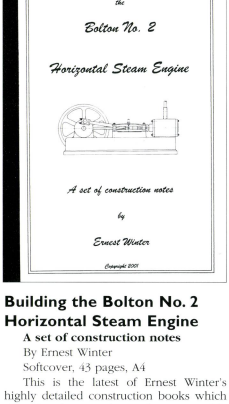
However I took the guides one step further and made them from square tube, split in half to form two channels, heated and bent at the ends to give a smooth run in for the moving belt. The system works perfectly and most important, reliably. As can be seen in the **drawing and photos** the drive works via a double pulley idler mounted upon the original motor mount, and the control rod extends horizontally and emerges at the front of the lathe below and to the left of the gearbox, and is connected via the knee action to an operating arm about 150 mm long, in my case, slightly bent to avoid ones knuckles contacting one of the gear selectors. *... (Continued bottom of next page)*







Product Reviews



Building the Bolton No. 2 Horizontal Steam Engine

A set of construction notes

By Ernest Winter

Softcover, 43 pages, A4

This is the latest of Ernest Winter's highly detailed construction books which give step by step instructions to enable anyone to build a working live steam model. The model, which is the subject of this book, the Bolton No.2 Horizontal is a small model of a mill type engine, with a cylinder of 5/8" bore x 1" stroke. The author is the supplier of castings for this engine and the book has been primarily produced as a companion to the casting set.

Like other construction books by Ernest Winter, this one is very well written with the absolute beginner in mind. The conversational, easy to follow style is nicely balanced with clear explanatory drawings. The book starts out with some historical information, a discussion on imperial versus metric (for this project) and then starts out on the construction sequence in a logical progression, starting out with the bedplate and working through to completion, a trial run and some words on a suitable boiler. There is also a layout drawing showing how to set up the engine with associated equipment as a working model.

As well as the instructions for building the engine, he has included lots of other useful information like safety in the workshop and instructions for grinding tools to the correct shape and dimensions for the job required. A search for particular information is an easy task with the clearly written index.

This book is aimed at a specific model, but there is a lot of information which could be most useful to someone embarking on other projects of this nature. Highly recommended.

Building the Bolton No.2 Horizontal Steam Engine

Price: $19.80 (plus postage)

Available from: E & J Winter, PO Box 124 Medowie NSW 2318. Phone/Fax (02) 4981 7999, email:ejwinter@ozemail.com.au Website: http://www.skynary.com/ejwinter

David Proctor

Another Lathe Clutch

... (Continued from page 60)

I found the action of reaching down with the left hand to operate the clutch became quite natural, and I prefer it to reaching over a moving chuck.

My workshop has a concrete floor and the lathe is bolted down, but the difference in having the motor mounted independently was quite remarkable in the reduction of vibration and noise. The fact that my lathe is mounted close to a wall and workshop space is limited meant that my design had to conform to a rather tight space between lathe and wall. I have omitted dimensions, however as I am sure most model engineers and 'tinkerers' are very ingenious and creative people and readers should have no trouble getting the 'gist' of this clutch mechanism.

Affordable Model Protection

(advertisement)

Too often "stolen" notices are placed in *Australian Model Engineering* indicating that a modeller's toil has been taken. In the case of a Live Steam Model, the boiler number does not seem to restrict the thieves' activities. Stolen model aircraft never seem to appear at mainstream clubs and are therefore rarely recovered.

"Thieves look for easy prey and a home with obvious security will usually be left alone," said Lindsay Brooks, a Director of the Australian Security Industry Association Limited (ASIAL) and National Operations Manager for WATCH24 Security Services.

In the world of security systems much is changing in terms of system design. Reliable protection can be provided with respect to the modeller's equipment, their family and modellers workshop. Their investment in time alone demands that modellers seriously consider protecting their valuable creations. The initial reaction of many modellers is commonly that an outlay of 1000's of dollars may be required which they may find difficult justifying to their families. With the WATCH 24© Monitored Security System, this is not the situation.

The WATCH24 Security System employs wireless technology to transmit signals to a local control panel, thus making it easy to install — even in rented premises. This means that where a workshop is separated from the family home, it can be protected without damaging the landscape or incurring the expense of underground trenching.

The WATCH24 Security System is connected to a Grade 1 control room where 'security events' are quickly brought to the attention of the officer on duty. Appropriate action is then taken according to previously issued and documented customer instructions which may include the despatch of a patrol car in an emergency in most capital cities and regional centres.

The WATCH24 Security System has a single button remote control which arms and disarms the system when required and also contains a 3 second press 'personal panic' feature. The Pool Gate Safety Sensor is another innovative characteristic of the WATCH24 offering. This device was designed to give parents precious seconds to check that children are not in a pool area unsupervised by alerting them with a special 'chirping' alarm inside the house whenever the pool gate is opened.

Protecting your family home and precious models with the innovative wireless WATCH24 Security System will cost an upfront installation fee of $295.00 or $395.00 for a system that includes an external strobe and siren. Both options require the payment of a monthly monitoring fee, which will vary on configuration, for a minimum period of 36 months. Ownership of the system will transfer to the customer following 60 months.

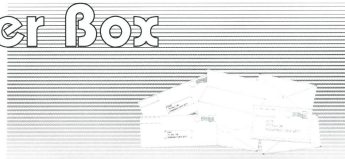
For further information and an obligation free assessment please call WATCH24 Security Services on 132 924 and mention *Australian Model Engineering*.

John Quigley

PRODUCT REVIEWS

Prices stated in all product reviews are those quoted by the supplier and are current at the time of going to press. As there is no guarantee of prices remaining unchanged, it would be adviseable to get a firm quote when you place your order.

Letter Box



Wheel flanges and back to backs

Sir,

I have just read Dave Adams' story on the construction of his "camel-back" *Blouefly* (March-April 2001) and do have to commend its attitude and contents to beginners in our hobby' with one proviso — please follow wheel back to back and flange standards. They were devised and are adhered to for very good reasons. Now that his loco is obviously running, I'm sure Dave will accept this letter in the constructive tone with which it is written.

When beginners do seek advice from other club members, I would hope that they are told to follow the AALS wheel flange (and flange back to back dimensions), not to turn over-size flange depths or widths. In fact this causes more trouble than it solves.

Causes of derailment are many — the most frequent is passengers tipping a carriage off — i.e. the carriage comes off and brings the loco to grief. Extra flange depth will not prevent this! Another is obstacles on the line. Unless there is incorrect spring weight on locos with a leading bogie or pony truck which can cause derailment at points, a significant problem can occur if a flange that is too deep rides up at the check rails at points so the treads are not in contact with the rail head. It will derail the loco most especially if there is a change of direction. If it is too wide it will bind between rail and check rail without good results either.

For whichever gauge a builder selects, dedicated form tip tools for the root radius and flange end radius save time and effort. A simple flange outline cut and filed in tinplate can be made to check flange dimensions. This eliminates much fiddling. I wish Dave many happy hours in his workshop building his next loco; I expect it's something different, too.

Hugh Elsol

Brisbane Qld

IBLS 2000 thanks

Sir,

After arriving back in New Zealand and unpacking the Shay things have now returned to normal.

Through the magazine, I would like to say a GREAT BIG THANKYOU to all the clubs and private railroads, including all the helpers that made the IBLS meet and follow-on-ramble south to 14 other venues such a success. It was one of the best and most enjoyable live steam trips we have taken. We were made welcome at all the venues and we had a great time.

We Kiwis have now been asked by several of the Canadian and USA live steamers to run a Railway Rendezvous in January 2004 through New Zealand. Planning is now well under way and details will be released soon when all are finalised. This will be in January 2004 for 4 weeks.

Thanks again Canadian and USA IBLS members for the great live steam ramble.

Dave Giles

Auckland NZ

(I'm still hearing about what a great time everyone had and what a lot of fun the trip was. I really wish I had been there too ... Ed.)

A warning when grinding!

(This letter and accompanying photo were forwarded to AME by Dennis Dalla Vicenza of Vancouver Island ME)

Dennis,

I'm sending you the following details of an incident that has happened to me while using a 1" belt grinder. I feel it might be applicable for publication in the newsletter as a warning for others. Although I was using a commercial model (Delta model 31-050) I feel it is just as applicable to any type, commercial or home made.

On 25 Jan I was using the grinder to smooth the edge of a hacksaw cut on a 2" length of 1.5" angle iron. I had been grinding for about 1.5 to 2 minutes when there was a loud "THUMP" accompanied by an approximately 2-foot diameter brilliant yellow-orange fireball. The fireball lasted no more than 1/2 second and then completely extinguished itself. It completely enveloped the machine and my hands to half way up my fore arms and to the top of my stomach.

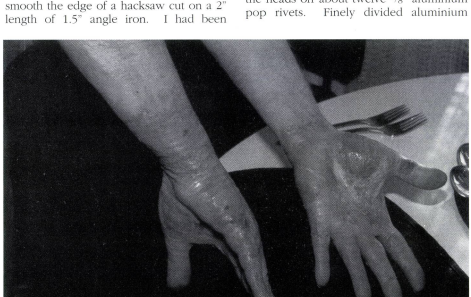
As soon as it went out it was obvious that I had suffered some serious burns to my hands, as besides large white areas on the heel of each thumb and the palm of my left hand the skin was hanging from the heel of both hands from my little finger to my wrist and from the finger joint of my left hand. Also the right cuff of my shirt was smouldering, my face felt burning, and I could hear the front of my hair sizzling. Nothing on the bench was burning. The only evidence was a few streaks of white powder on the bench top and on a few items lying on the bench. The workshop was filled with dense white smoke with very little odour.

My fingers and the ends of my thumbs escaped relatively unscathed as they were resting on the machine's table and were protected from the heat flash by it.

Besides the burns to my hands, my neck, chin, cheeks, lips and the end of my nose suffered first-degree burns and have recovered after peeling as if a bad sunburn. I was wearing glasses and these protected my eyes, which appear to not have been damaged.

I also lost half my moustache, 3/4 of my eyebrows, and about 1" off the front of my hair. My eyelashes were curled by the heat but not singed. The burns to my face were caused solely by radiant heat, as the fireball did not come that high.

Initially I could not understand how I could have suffered such severe burns from such a brief exposure to the heat. Later that evening, after some thinking and questioning of my son (who also uses my workshop), it became clear what had happened. A few days earlier he had ground the heads off about twelve 1/8" aluminium pop rivets. Finely divided aluminium



mixed with finely divided ferrous oxide (the black powder residue from grinding steel) produce a compound called "THERMITE". Thermite is used to fill incendiary bombs and commercially to weld large steel items, i.e. railway rails into continuous lengths. It burns at approximately 3500°C (6300°F), hence the extensive burns from such a short exposure time.

The end result was, excluding my fingers; I suffered deep second-degree burns to about 60% of my left hand and 50% of my right hand.

Interestingly there is no warning of this possible occurrence in the safety section of the manufacture's owner's manual. As a. result I have sent a copy of the contents of this letter complete with pictures of my hands to Delta Machinery. Their reply should be interesting!

In light of my experience I feel there should be a very STRONG warning passed on to the readership as to the dangers posed by grinding steel after having ground aluminium, unless the machine is thoroughly cleaned of all aluminium dust. The potential is certainly there for even more serious injury. . . .

John Purdy
Comox BC, Canada

Superelevation

Sir,

Thankyou for publishing my letter of 14 December 2000 concerning superelevation — the Gremlins must have got the decimal point in front of the 6 in the last line — a superelevation of 6 inches in 7¼ inches would result in real "Wall of Death" stuff and perhaps a bit too exciting for model engineers.

The real superelevation is six tenths of an inch or nineteen thirty-seconds of an inch of fifteen millimeters.

Graham Bailey
Samsonvale Qld

(Sorry about that, Graham. It would certainly get the adrenalin flowing ... Ed.)

Narrow gauge loco stability

Sir,

It has been with a great deal of interest I have been a subscriber to your magazine and as time goes by, I can't help but think of the years of experience that is lost to any hobby by the inability of people to have recorded their experience, or call it in many cases, their expertise.

With 22 years of actual railway experience from messenger, when I was breaking my neck to be a driver, but couldn't become a cleaner till I was 17 years of age. I did the next best thing for three months. I assisted the fireman to light up the local at 3:30am, then the usual eight hours work in traffic. I later had the opportunity to spend a lot of spare time over a period of six months in the workshops. The engines were being stripped for boiler inspections and heavy maintenance carried out. I did manage to put in many hours steam and diesel driving through to years on the Commissioner's staff. As a wartime member of the RAAF aircrew (heavy bomber squadron) later with a few years flying as a private pilot, I feel I bring some experience to the subject of balance of machines and particularly railway engines.

The balance in a steam locomotive is of extreme importance and yet I have not seen much mention of it in construction details. Balance is, or should be built into a loco in the specifications of the materials used in construction, but how often does the backyard expert decide as follows:

- A heavier catcher on the front will save damage to my engine in a collision
- More solid smokestack will last longer
- Decent solid buffers will look much more realistic
- A heavier buffer beam will give me more weight and prevent wheelslip
- Or on the back end, a bigger and heavier cab is more comfortable
- Might as well make it a sit-in cab
- Why not a heavier footplate, will give the engine more traction

And so the list goes on and the engine ends up as inherently unstable.

Why mention flying in this, it does not relate to an engine being unstable. It most certainly does as the balance of an aeroplane is critical, and weight distribution is a critical and life saving factor.

Just imagine an aeroplane load is not securely fastened. The plane races down the runway, lifts off and climbs away in a flying attitude that causes the load balance to slip toward the tail, causing the plane to go into a stall, and the rest is history. Not fiction nor a flight of imagination, as the accident records prove this to be a very fatal occurrence.

And so back to locomotives. If the weight is not evenly balanced over the drivers the engine will not perform to its maximum. The power must be uniformly concentrated on the rail and if there are pony trucks and trailing bogie wheels, then their function must be to spread the load evenly over all wheels for efficient stability and to assist the engine in even tracking with minimal pitching or yawing. Note there is no mention of track as that is a completely different factor in train performance.

To get the best of an engine design, the balance of the engine must be fine tuned during construction.

In the case of narrow gauge so-called cane locos they do not allow for proper balance distribution. They have been scaled down in design, however the driver is not scaled down and is very much an out of balance weight factor, the equivalent of approx. 25% of the loco weight. This creates a massive out of balance factor on the tail of the loco where the driver sits in the cab. The weight of the driver severely affects the longitudinal plane of the loco in so far as weight is on the extremity of the balance factor creating a pendulum effect.

When the loco is starting to move or traveling up hill (like the plane's slipping load) the weight is being concentrated more to the rear, and in almost 100% of derailments with these locos, it is on a rising grade where the pendulum effect is most pronounced, and more particularly when they are hauling a load (as in a tractor backflip), the drive power forward on the wheels coupled with the drag back will always create a tendency to backflip.

Proper balance is an extremely important safety factor in machines as this inherent stability factor must exist, and must be carefully monitored in any design by everyone concerned with safety.

In the Australian live steam movement there is a tendency toward bigger and heavier locomotives, from my experience I would consider it to be creating a more dangerous situation, and one where most of the accidents will go higher. I'm not a prophet, but unless AALS or some other authority set up a limiting standard on these designs, they will have to be barred from tracks purely on safety reasons.

Laurie Woods
Brisbane Qld

Van Diemen Light Railway Society

Sir,

In the latest issue of AME, the Don River Railway is mentioned as a club track.

I regret to inform that this track is no longer operating. A part of the track was removed to allow the extension of the museum buildings. A new route will have to be designed and hopefully that will be done and track laid (by someone else).

The history of this railway started in Nov. 1985 when I retired from work on a Friday and I started laying track on the Monday. This project was an arrangement I had with the museum management. It proved to be an additional revenue earner for the museum. I operated with both steam, 0-4-2 narrow gauge type and a diesel electric type locomotive with straddle carriages on 7¼" gauge — ¾" square tube rail. After many years of pleasureable experience with management and passengers, I decided to retire when the track circuit was broken.

Chas Goodwin
Ulverstone Tas

Letterbox Contributions

You are welcome to send letters by mail to:

PO Box 21, Higgins, ACT, 2615 or
fax to: (02) 6254 1641 or
e-mail to: **amemag@bigpond.com**

As far as possible, AME is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion as long as they are not libellous will be considered for publication.

Please **type or clearly print** your letters, as script is often difficult to interpret.

News Desk

with David Proctor

G'Day again! Several subscribers received the last issue up to four weeks late and a few never received it at all. I have no idea what happened as they were all mailed at the same time and Australia Post have not been able to give any indication what happened. I guess the wheels must have fallen off the postal system somewhere!

Sales of the magazine have increased to the stage where we did not have many spare copies of the last issue left for new subscribers and late renewals. Our apologies for any inconvenience — the print run has been increased so that, as in the past, there will always be plenty of spares.

Damn gremlins!

In the last *Newsdesk* I listed a couple of corrections from the *Anybody for Steam Turbines?* article in the previous issue. Well, a gremlin got into the correction. The line should read

gc = constant - 32.2 ft lb÷ lb f sec2

Are you there?

A request from Barry Glover — would the person who wrote to him about large locos please phone him on (02) 4284 0294 as the letter got somewhat wet and soggy and is unreadable.

Contacting me

There have been a high number of phone calls to lately where the callers have hung up without leaving a message. I would just like to emphasise what it says in the *Crew* list on page 5. ***If you phone before 3pm be prepared to leave a message*** and I will call you back if needed as soon as I can. After 3pm I am usually not far away, but again there can be exceptions. AME is a part time operation only and we do not have a staffed office — the office is one end of my lounge room. When leaving a message please state your phone no. clearly because there have been times when I haven't been able to return a call because I could not understand all of the number given.

Late news

I have just received advice from the **Mudgee Miniature Railway** that their Mudgee Wine Festival Invitation Runs this year will be held on 1-2, 8-9 and 15-16 September. The track is 3½"/5" gauge ground level. As usual, it will be a great time in Mudgee. You need to book accommodation early as the town fills up quickly. Full details next issue. Contact Peter King (02) 6373 3626 or write to PO Box 373, Mudgee NSW 2850, the correct address for the club.

Until next time, great steaming!

Classifieds

5" gauge petrol loco for sale

- 0-6-0 Hunslet style, complete with braked riding truck, new battery. $3000 ono. Ph. Dave (02) 4739 2648

Injectors, valves and brushes for sale

- Injectors No.3 ¾ pint $55, No.4 1¼ pint $60, No.5 2⅔ pint $75. Bronze tube brushes ½" and ¾" $18 ea. Steam valves ¼" 90 and 180 deg. All items new, made in UK. Price incl. post. Ph. Peter (02) 4975 4548

Scale Steam Locomotives & Rolling Stock (reg.)

- Specializing in Victorian Railways Steam Locomotives, Rolling Stock and Accessories in 5-inch gauge. Currently under construction, or presently available, are Z and ZL Goods Vans, GY's, I and IY's, S and Q Flat Top Bogied wagons, E Steel Bogied Gondolas, K Flat Top wagons, T Goods wagons, Oil and Acid type tankers and P Explosive wagons (others hopefully to be produced soon). All wagons are complete and ready-to-run with individual coding and numbering, auto couplings and air hoses and finished painted in any of the colour schemes used by the Victorian Railways. Now under construction are two (2) Victorian Railways N class 2-8-2 type locomotives in 5-inch gauge, and both will be offered for sale as ready-to-run. For further inquires on our products, or if you would like a copy of our complementary Catalogue, please contact Erik or Dennis at our address by mail, phone, fax or e-mail us at Scale Steam Locomotives & Rolling Stock (reg.) PO Box 492, Daylesford, 3460, Victoria, ph/fax: (03) 5348 4135, e-mail: steamers@netconnect.com.au

Help available

- Turning, milling, fabricating, tooling. Will tackle anything. Ring Frank Zizza on (03) 5795 1551

4" lathe chuck for sale

- Inside/outside jaws in good condition for only $250. Contact Noel Taranto on (02) 4787 6301 (evenings)

Unused gas burner, suit Stuart Turner 504 boiler or similar. $85. Ph. Bruce (02) 4868 2030

Eaton Hydrastatic drive 2nd hand $1000. Ph. Brian 0414 672 426 after 6:00pm

Lathes, HAFCO 220 dia by 500 centres as new $1000. Nuttall 350 dia by 900 centres, fully equipped $2000. (02) 6352 1018

Complete issues ***Locomotives Large and Small***, Don Young, 58 issues complete $200. Ian (08) 9721 2034

Qualos horizontal mill $600.00 ono. (02) 9654 1072

Plans and castings Great Western King class locomotive. Ron (02) 4861 7837

Castings, plans, frame steel Mona 3½" $200, Molly 3½" $200, Speedy 5" $300, Stirling Single 5" $900, Stuart No.1 $540, No.8 $250. Ted (02) 9746 7738

Four wheel bogies 4½" centers, all steel construction, $500 pair. Ring Frank Zizza on (03) 5795 1551

Stuart Turner Compound Twin **Launch engine kit**, complete. $420.00. Phone (03) 6331 8285

SWAP

Eleven new P&N 16" **high speed steel hacksaw blades** for 14" ones or sell @ $10.00 each. M Hollensen (03) 5174 2109

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FOR SALE

Set of **5 drawings** for 7¼" gauge passenger bogie $100 ono. Phone Steve (03) 9734 7702

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- Don't send payment with ad, we'll invoice you after publication. No limit to the number of words.

Subscribers Free Market conditions

- Non-commercial only, at the publisher's discretion.
- Maximum of twenty words, including your contact name, phone number or address.
- Posted, on special form provided. No faxes please.
- 5" gauge or larger locomotives (for sale) are not eligible.
- Only one entry per issue.

AME Retail

BOOKS

38	$72.00
50 Years of the Sydney Live Steam Loco Society	$12.50
Among Their Favourites	$48.50
Australian Steam Locomotives 1896-1958	$72.00
Australia's Last Giants of Steam, David Burke,	$55.00
Away with Steam	$28.00
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